The

Electrical Review

VOL. CII. FEBRUARY 24, 1928. No. 2,622.

THE OLDEST ELECTRICAL PAPER. ESTABLISHED 1872.

Published every FRIDAY, Price 6d.

Chairman: H. ALABASTER.

Technical Editor: A. H. ALLEN, M.I.E.E. *Joint Managing Directors:* G. H. ALABASTER. E. A. GATEHOUSE M.I.E.E., A.M.INST.C.E. *Commercial Editor:* A. H. BRIDGE.

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OFFICE: 4, LUDGATE HILL, LONDON, E.C.4.

Telegraphic Address: "AGEEKAY, CENT., LONDON," Code, A B C. Telephone No.: Central 7672 (Three Lines).

The "Electrical Review" is the recognised medium of the Electrical Trades, and has by far the Largest Circulation of any Electrical Industrial Paper in Great Britain.

SUBSCRIPTION RATES, Postage Free: United Kingdom, £1 14s 8d.; Canada, £1 12s. 6d. Colonial and Foreign, £2 1s. 6d. per annum. Cheques and Postal Orders (on Chief Office, London) to be made payable to THE ELECTRICAL REVIEW, LIMITED, and crossed "Midland Bank, Newgate Street Branch."

For List of Foreign Agents for the ELECTRICAL REVIEW see Advertisement Supplement.

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The Institution and the Institute.

WITH the minimum of fuss and formality, on Thursday last week the Institution of Electrical Engineers and the American Institute of Electrical Engineers took part in a simple function which, had it happened 50 or even 20 years ago, would have been regarded as an event of tremendous importance and significance, as a feat due to supernatural agencies, or—most likely of all—as an elaborate and mischievous hoax. A hundred years earlier, probably one would have been hanged or burnt for sharing in a performance that could only have been accomplished with the aid of witchcraft.

What happened was that, in brief, nearly 2,000 members of the two great electrical engineering institutions sat in joint session for half an hour, and, though sundered by 4,000 miles of sea and land, listened to the felicitations of their respective presidents and to various addresses, heard a resolution moved and seconded, and voted on it—as though separated only by a thin partition. In fact, the hearing was actually much better than, too often, it is at meetings marked by no such extraordinary circumstances. The feat was rendered possible by the wonderful developments which have taken place in the art of speech transmission during the last few years: it is not yet fourteen months since commercial transatlantic telephony was inaugurated, the efficient loud-speaker is a product of broadcasting which began only five years ago, and the thermionic valve was hardly known before the war—so rapid and comprehensive an evolution of an art was never known. To give credit to all who have shared in it would take more space than we can spare, but we rejoice to think that British physicists, inventors, and statesmen have taken a large share in the work. But so far as regards the achievement of February 16th, credit must certainly be given—to the engineering leaders who planned the demonstration, and to the departments which by their co-operation, technical equipment, and willing enterprise, made it possible, namely, the American Telephone and Telegraph Company on the one hand,

and the British Post Office Engineering Department on the other. To these bodies we offer very hearty congratulations on a feat which, as was stated at the meeting, was of an epoch-making character.

The younger generation of electrical engineers, born into a world seething with scientific marvels, may not be deeply impressed; but those who have been privileged to watch, step by step, the gradual evolution of those marvels fully appreciate the wonder of the new miracle which has been accomplished. "Let us now praise famous men!"

Improved "Underground" Results.

THE figures relating to the working of the electric railway members of the "Underground" group which appear in our "City Notes" this week are a record of progress. The traffic statistics and the net results show improvements in every case, with a consequential rise in dividends, except in the case of the Central London Railway which maintains the 1926 rate.

Improvement was to be expected, having regard to the industrial troubles of the preceding year; but it goes further than that, the comparison with 1925 also makes a very good showing. The City and South London Railway shows the greatest advance, this, of course, being due to the fact that the line was partially closed for reconstruction for a long period. The London Electric Railway also showed a satisfactory improvement. In all four cases the ratio of operating expenses to traffic receipts showed a decline. The combined ratio was 59.44 per cent. (against 62.41 in 1926) and the greatest improvement was shown by the Central London Railway—62.94 per cent. against 66.56 in 1926. The City and South London line recorded the remarkably low ratio of 49.92 per cent. although the number of passengers per car mile appears to have been the lowest of the group. The fare paid per passenger was, however, the highest. A total of £1,277,000 was spent by the four companies on capital account. Rolling stock (£345,000) was the biggest single item, although the reconstruction of stations involved a larger aggregate sum. Sub-stations accounted for the expenditure of £60,000. The estimated future capital expenditure amounts to £2,627,000 (including £304,000 for purely omnibus requirements); rolling stock will take over half of this (£1,363,000), and sub-stations will account for £26,000.

This expenditure will provide some good business for the electrical industry: we have already reported the placing of two important orders by the Underground group, with the General Electric Co., Ltd., and the British Thomson-Houston Co., Ltd.

The South-East England Electricity Scheme.

THE issue by the Central Electricity Board of the scheme for South-East England, embodying the results of its conferences with the undertakers concerned and its further investigations, is an event of the first consequence to the electricity supply industry of this country, the area scheduled being in certain respects the most important and comprehensive of all, whilst it is also probably the most difficult to deal with, owing to the multiplicity and variety of the interests involved. In view of the circumstances, including the highly critical attitude adopted towards the scheme by many of the undertakings that were affected, the Board is to be congratulated on the completion of its deliberations within three months of the date by which representations had to be lodged—a celerity without parallel in the history of electrical systems proposed for the metropolitan area.

We give elsewhere in this issue a summary of the new scheme, which will be found to differ materially from the original proposals; the large concessions that have been made to authorised undertakers should go far to appease the hostility with which the scheme was received, especially by some of the municipal undertakings, and we are disposed to believe that by making greater use of existing plant the Board has moved in the direction of increased economy in capital cost without materially affecting the working cost. The substitution of Fulham for Chiswick as the site for a large development of power is a noteworthy departure from the original plan; it will involve considerable disappointment to those concerned in the design of the Chiswick station, and our sympathy is with them and with the Joint Electricity Authority, which has suffered somewhat severe rebuffs in its well-meant endeavours to cope with the electrical needs of its huge area. So drastic a change can only have been made on very substantial grounds. Possibly "Station B" will be at Chiswick!

Generally speaking, the new scheme bears evidence of a determination on the part of the Board to do its best for electricity supply without regard to preconceived ideas; we hope that its decisions will be loyally accepted by all parties and will be justified by the results attained.

Portable Electric Tools.

NOT long ago, at an informal meeting of the Institution of Electrical Engineers, attention was focused on portable electric tools. While great progress has been made in recent years, especially in the development of the electrical drill, there is still great scope for the designers and manufacturers of portable electric tools in connection with various industries; for example, there are many clothing factories in the North of England and in the Midlands, and it is surprising to note how few of them have installed electrically-operated portable cloth cutters, although in mass-production clothing factories these are admitted to have many advantages over the belt-driven knife. In a very different direction—the foundry industry—portable electric tools ought to have made more headway than they have done. In foundries where there is a sand-blasting plant, the air compressor is available for pneumatic tools such as chipping hammers, but in many small foundries not equipped with compressors, electric tools are exceedingly economical; even in larger foundries where pneumatic tools are used at present, electrical tools in many cases would be more advantageous. It is much easier to connect up an electric tool than a compressed-air tool, and the former is much more suitable to foundry conditions. There appears to be no good reason why, for small repetition work, electrically-operated moulding machines that can be conveniently moved about the foundry, if required, should not be installed in both ferrous and non-ferrous foundries. In the dressing shop an electrical emery grinder is a more convenient tool than a flexible shaft grinder, while for cutting off gates and risers an exceedingly useful tool would be an electrically-operated circular saw.

After-dinner Oratory.

IN most respects the recent annual dinner of the Institution of Electrical Engineers was more than ordinarily successful; there was a record attendance, and in only one feature were the proceedings open to criticism—the quality of the speeches, on the whole, to be quite candid, was poor. If speeches were omitted altogether we believe that the audience would heave a sigh of relief—and as most of the speakers *said* they didn't wish to speak, *they* would have no ground for complaint! Some of the trade association dinners are very tedious; long, empty speeches are made one after another by people who should certainly be

"Sent to hear sermons by mystical Germans,
Who preach from ten till four."

Or, as an alternative, the chairman should be given extended powers and a heavier gavel.

The B.E.A.M.A. set a good example at its last dinner. There were several speakers, but there was a time-table to which they rigidly adhered.

An Electric Suction Dredge.

For the building of stop banks and the cutting of canals in the Thames Valley, New Zealand, to prevent the flooding of large areas, the Public Works Department has built and is operating an electrically operated suction dredge.

By "HOMIE."

IN 1913 the Public Works Department in New Zealand inaugurated what is called "The Waihou and Ohinemuri Rivers Improvement Scheme." During heavy rains these two rivers overflow their banks and inundate large tracts of country in the Thames Valley and Hauraki Plains districts to an extent of approximately 540,000 acres, and the flooding causes serious loss to the farmers, not only in respect of crops, but also of live stock and property. It was decided to build stop-banks or levees on the rivers, and to cut canals through at certain places to eliminate some of the acute river bends and make a shorter course to the sea. Paeroa was chosen as the centre of operations, and the whole scheme was placed in charge of the resident engineer there. Paeroa is only 13 feet above sea level, about 16 miles from the coast,

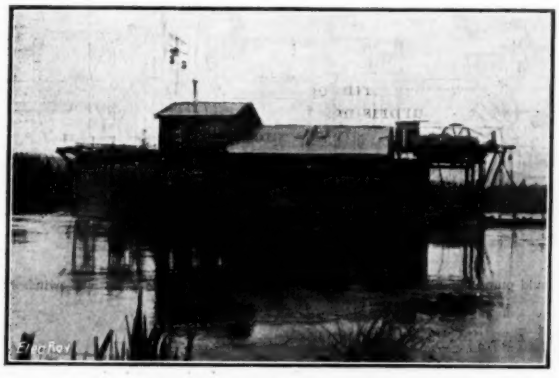


Fig. 1.—The Electric Dredge.

in a direct line, and 22 miles by river. The river is tidal as far as Te Puke and is navigable for ships with draughts up to approximately 10 feet at high tide. Workshops were erected at Te Puke, near the junction of the two rivers, about two miles from Paeroa, and work was commenced on the upper reaches of the rivers with a steam suction dredge, drag-lines, a dipper dredge and log haulers. The dredging serves two purposes, to erect stop-banks and to dredge a channel for the shipping, and the present scheme includes the carrying out of this work on a twelve-mile stretch of river from Te Puke towards the mouth. To speed up the work on this section and assist the steam dredge working there, it was decided to design and build an electrically operated suction dredge with a larger output than that of the steam one. The new dredge, fig. 1, as far as the writer is aware, is unique, as the power is taken on board the vessel at 11,000 volts. It was designed and built by the Public Works Department and was ready for commission in July, 1925.

A tapping is taken off the Thames Valley Electric Power Board's 11,000-V, 3-phase transmission line, through an air-break switch, at a point nearest the section of the river to be dredged. An overhead line is run from there to the river bank, and is carried in each direction for a mile and a half or two miles. A cable is also laid across the river and other lines are erected for the same distance on the opposite side. The tap line is protected on the pole nearest the Power Board's line by an air-break switch, a Kelman oil switch with overload trips, and so on. Air-break switches are also erected at intervals on the river bank to enable the dredge engineers to isolate the part of the line they are working on, without having to go to the extreme end of the tap line to do so. The lines are not, of course, all erected at one time. While the dredge is working on one section, the previous section is being taken down and re-erected in the opposite direction or on the other bank. From the overhead tapping pole, fig. 2, a three-core, rubber-insulated and steel-wire armoured cable runs along the pontoons, attached to a wire-rope messenger, up over a guide wheel, and down on to the deck where the surplus is coiled up in a figure eight on a wooden platform. From the coil on deck the other end is taken into the engine-room and through to a h.p. cubicle containing the isolating links, main oil switch, voltmeter, ammeter, three time-element overload relays, and three watt-hour meters, together with the usual instrument transformers. From the h.p. cubicle a three-core cable is taken to a 300-kVA, 11,000/400-volt, oil-cooled transformer, and from there to a l.p. cubicle for the main pump motor. Tappings are taken off at the l.p. cubicle to two 25-h.p. motors, a small 7-h.p. motor and a 230/110-volt lighting transformer. The main pump has a 12-in. suction and discharge, and is designed to pump against a 120-ft. head. It is coupled directly to a 250-h.p. slip-ring motor fitted with a brush-lifting and short-circuiting device. The speed of motor is 485 r.p.m., but this can be reduced by an iron grid-rheostat controller. The two 25-h.p. motors are also of the slip-ring type,

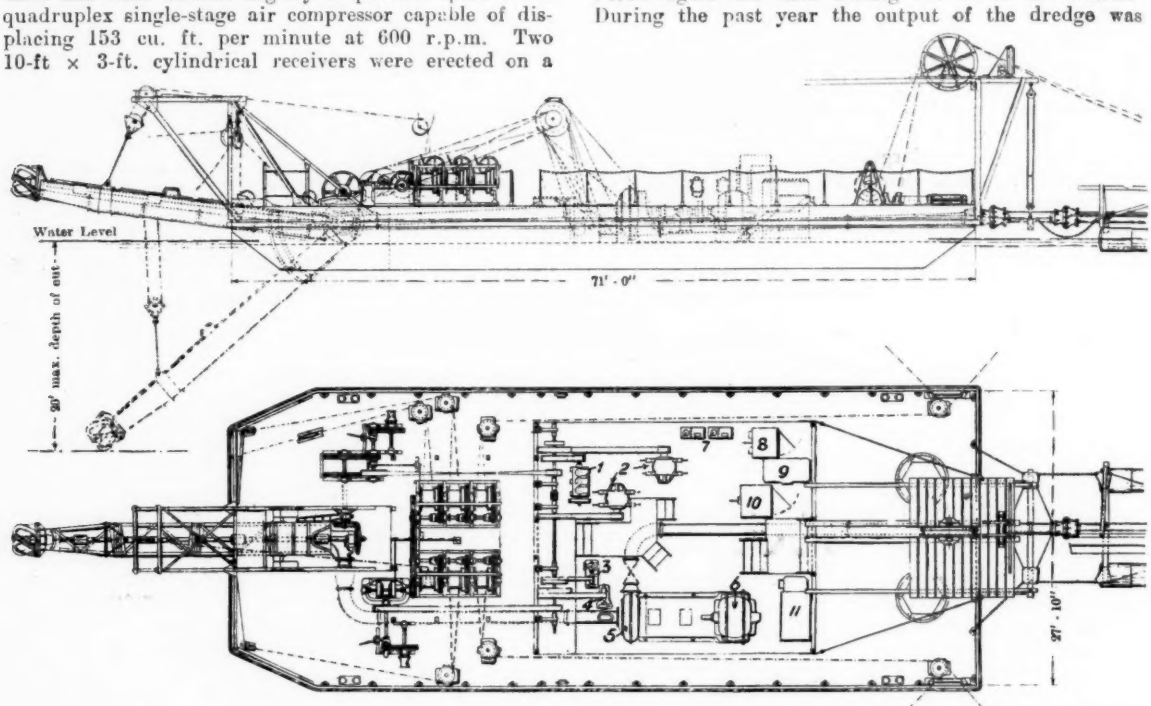
Fig. 2.—Tapping Pole and Pipe Line.

fitted with short-circuiting devices, and run at 720 r.p.m. They belt-drive on to separate sections of a two-part counter-shaft running at 234 r.p.m., and the two sections can be coupled or uncoupled while running by means of a claw coupling. From one section of the counter-shaft a belt drive is taken to helical gear wheels which drive the cutter shaft at 15 r.p.m., and from the other section a belt drive is taken to a differential gear for the winch drums. A belt drive is also taken from this section to a small Tan-Gyro pump for the tanks and bilges. In the event of a supply failure, to provide power for mooring, the counter-shaft can be driven from a 20-h.p. petrol motor, and a small petrol-electric lighting set is also carried for emergency

lighting. The general lay-out of the dredge and its machinery can be seen from the accompanying drawing, fig. 3. Since the drawing was made, however, the winch drive has been altered, and also the small pump for the water-sealed bearings and primings. The winch drive through the differential was not flexible enough, and the speed of the winches could not be varied as required. The positions of the 25-h.p. motors have also been altered slightly to provide space for a quadruplex single-stage air compressor capable of displacing 153 cu. ft. per minute at 600 r.p.m. Two 10-ft × 3-ft. cylindrical receivers were erected on a staging at the back of the dredge, and an air motor developing 18 h.p. at 85 lb. pressure was coupled through reduction gears to the differential shaft. This is a considerable improvement and any desired speed can be obtained. The Gould pump for the water supply to the sealed bearings on the main pump and cutter head has been replaced by a small Roturbo two-stage centrifugal pump directly coupled to a 7-h.p. squirrel-cage motor and placed on the main pump bedplate. The discharge pipe from the dredge is carried along the pontoons, fig. 4, each of which has a 36-ft. length of pipe with a ball-joint on one end, supported by cross timbers resting on two 32-ft. × 2-ft. cylindrical steel floats. The method of coupling the pontoons is shown in the drawing, and also the chains on either side to prevent the ball-joint pinching and twisting the flanges. Great trouble was caused at first by the rubber insulation on the cable perishing, due to ozonisation, particularly on the tails of the air-break switch on the pole. This has now been practically overcome by taping the tails first with pure para rubber, and then with black adhesive tape, and varnishing the whole; the cable itself has been wrapped with tarred canvas and served with marline.

The dredge works two shifts of 48 hours per week. Flood lights are used during the hours of darkness. During the past year the output of the dredge was 221,817 cu. yd. of material, consisting chiefly of sand, silt and mud, at a total cost of £12,979—that is, an average of 18,486 cu. yd. per month, inclusive of repairs, holidays, and so on, at an average cost of 1s. 2d. per cu. yd., after meeting all charges, depreciation, overhaul, etc. It must be understood that in river work of this kind, the major portion of the day shift is taken up by moving the dredge and pipe lines, putting up trestles and pipes on the bank, and shifting the mooring lines, otherwise the output would be considerably increased.

The *modus operandi* is, of course, the same as on any other dredge of this type, but it may interest readers who have not had the opportunity of seeing any of them at work. The dredge is moved or warped by wire ropes made fast on tree stumps or dead-men on the river bank, and pulled by the winches on board.



1, 20-h.p. Anderson oil engine; 2, 25-h.p. motors; 3, Tan-Gyro pump; 4, Gould pump; 5, 12-in. gravel pump; 6, 250-h.p. motor; 7, starters and switches for 25-h.p. motors; 8, switch cubicle; 9, transformer; 10, high-pressure cubicle; 11, starter for 250-h.p. motor.
NOTE.—The deck shown in fig. 1 has been omitted from the drawing in order to show the equipment more clearly.

Fig. 3.—Lay-out of Electrical Equipment on Dredge.

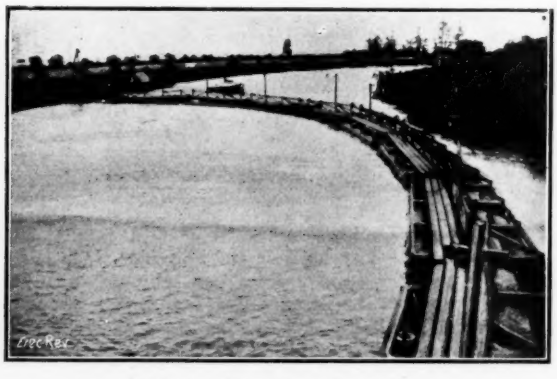


Fig. 4.—View Along Pontoons.

Fig. 5.—Construction of Pipe Line.

On the landing section two wire ropes are attached to two hand winches. One of them, the check line, is carried forward and made fast on the bank two or three chains up from the shore ball-joint. The other line, the tail line, is carried back about the same distance and fastened ashore. As soon as the check line is set, the tail line is pulled up until both lines are tight. After every cut the dredge makes across the river and back, the tail line is let out a few turns, allowing the head line to pull the dredge into a new cut. This goes on until the tail line has been let out so far that the shore ball-joint is almost pinching on the opposite side. The pontoons are then uncoupled on the dredge end, the tail line is pulled up tight on the check line again, and another pontoon is inserted. When putting on a pontoon, the wire-rope messenger (which also carries the cable) is paid out until sufficient space is available for the new pontoon, which is then hauled into position. The messenger is then pulled up tight with a hand winch until the pontoon joints come together, when they are coupled up.

When the dredge has been moved ahead so far that all the twelve pontoons have been put on, the pipe line is shifted. When shifting the line, the shore part of the cable is coiled up on a platform on the landing section and put ashore again when the pipes have been coupled up at the next pole. A hand winch on the small section next to the landing section takes the weight of the shore pipe and ball-joint when uncoupled from the pipe line.

The shore pipes are carried on trestles, fig. 5; they are 20-ft long and have three holes fitted with slides on the underside. Wooden chutes are fastened under the holes and guide the sand to the desired place, thus obviating a great deal of shovelling. The sand settles almost as soon as it leaves the chutes, while the water is carried forward for some distance and goes out through a drain into the river again. As the stop-bank progresses the trestle legs are unfastened from each other, and pulled out separately by jacks. The size of the stop-bank varies, of course, with the height of the original bank above high-water level, and gradually tapers off to nothing some miles from the mouth of the river.

After the dredge has deepened the channel and built the stop-banks with sand, &c., the steam drag-line, following on behind, pulls out all the trees between the stop-bank and the river, covering the stop-bank overall with a layer of good soil. Grass seed is then sown to bind the soil together, and the work is completed.

Rural Electrification in England.

Some reflections inspired by the example of Continental countries, whose experience ought to be availed of and applied to British conditions.

By ALFRED EKSTROM, D.Sc.

RURAL electrification in England has every prospect of becoming a very remunerative and useful enterprise if properly carried out.

While the electrification of towns and urban districts in England, as in most other countries, reflects a gradual adaptation of the technical developments in this field and the more or less haphazard conditions under which it has been carried out, the electrification of the rural districts has been almost entirely neglected.

The proposed national scheme will, no doubt, though often at considerable cost, tend to correct initial mistakes, and it will make it possible to undertake the electrification of the rural districts in England in a way that will be incomparably more systematic and financially sound than is the case in any other European country; England has the advantages of possessing an educated and prosperous people, and a soil with good agricultural possibilities.

In order to ensure the success of rural electrification in England, it is requisite *first*, that the mistakes made in this respect in other countries should be carefully noted, *secondly*, that the best technical results hitherto obtained in this field should be recognised, and *thirdly*, that the experience gained in other countries should be utilised in so far as it may be applicable to English conditions.

The countries which will be found to be of special interest for this purpose are Germany, Holland, Denmark, and Sweden. Of course, there is also a good deal to be learnt from Switzerland and Norway, but both these countries present such exceptional features in respect of their power resources and the occupation of their populations, that they have less to teach us in this connection than the former countries.

Fig. 1.—Complete Trench-Digging, Cable-Laying, and Refilling Equipment.

Sweden, finding itself without coal and oil during the war, and possessing abundant waterfalls, was forced to develop an intensive activity to provide the countryside with the power it needed for handicraft, small industries, and agriculture, as well as for lighting purposes, with the result that its rural electrification is now more widely extended than that of any other country. Of course, this extensive rural electrification in Sweden has involved many costly mistakes, but the experience thus acquired, especially in the south of

Sweden, where the natural structure of the country is very similar to that of England, should be peculiarly valuable for the latter country.

The fact that electrification in Sweden depends for its power supply on waterfalls, while in England the energy is produced at large steam stations, is of no

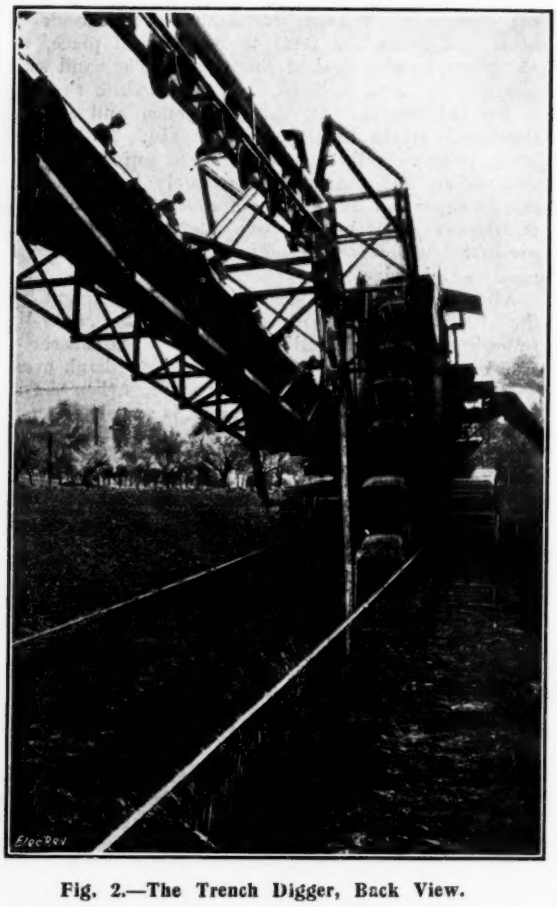


Fig. 2.—The Trench Digger, Back View.

essential importance, the cost of the energy produced being in both cases approximately the same.

Necessity of a Systematic Plan for Rural Electrification of each County.

The task of the national scheme in England now under preparation is to supply cities, important industries and larger communities in a systematic way with their requirements of electric energy.

In planning such a power system it is also important to make such dispositions that the surrounding country districts can be supplied with their power requirements, be it for handicrafts, small industries, agriculture, or the home—in other words, rural electrification.

Such a scheme does not necessarily mean that every cottage in the country would be electrified. Distant and isolated smaller groups of consumers might not be able to be connected up with the power system, if the electrification had to be planned economically.

In planning a rural distribution scheme for an area it is therefore necessary to differentiate between economically electrifiable and "non-electrifiable" districts in the area. On the other hand, such provisions must be made that later on—in the event of the energy requirements for a "non-electrifiable" district being increased—a development of the electric supply can easily be arranged.

The projection of such a scheme is nowadays a comparatively easy task as soon as the necessary statistical data are available, and ought certainly to be prepared for every country interested in a systematic development of its electricity supply. In Sweden a Royal Commission was appointed about 10 years ago which worked out detailed plans for the electrification of every county of Sweden, as well as a national superpower system for the whole country.

The practical exploitation of such a scheme is, however, a very complicated and difficult task. Its success is primarily dependent upon the experience and efficiency of those who undertake this kind of work.

Even when the electrification of a district or group of consumers will undoubtedly be successful if *generally* adopted by its inhabitants, it will require a patient, strenuous and well-organised propaganda before the full value of the electrification is understood by the eventual consumers, so as to make realisation of the plans economically possible.

Moreover, this propaganda must be organised systematically from district to district in such a way that the exploitation may develop continuously from one centre of supply. Every plant which is built or extended must, from the beginning, form a part of the projected main scheme.

Any development not in accordance with such a planned system will not only entail subsequent waste of capital, when the connection of all the different plants can be practically carried out, but may even make a later electrification of certain districts economically impossible. The danger of allowing smaller districts to develop their own electricity supply systems should also be mentioned. This procedure is obviously quite unpardonable when the power supply is not arranged in accordance with a general scheme for the area of which the district forms a part. But even if the transmission of energy to such a district harmonises with the larger

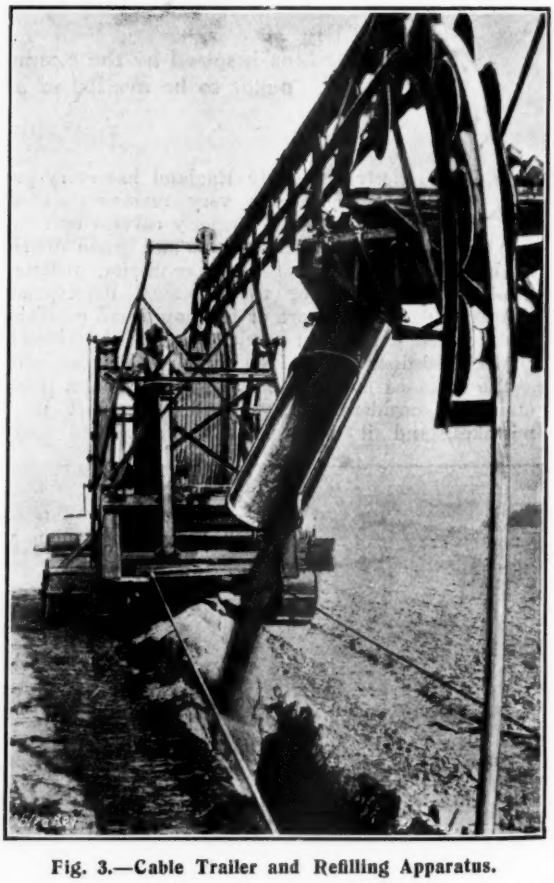


Fig. 3.—Cable Trailer and Refilling Apparatus.

system of the area, there is another circumstance which is often overlooked. Electricity supply is a factor of such economic and social importance for the welfare and comfort of modern society that technical and economical possibilities should exist for a successful development of this industry.

The management of an electricity undertaking is, however, very complicated, and necessitates a thorough

technical and economical knowledge of the subject. In order to secure a really capable managing staff, such an undertaking must necessarily have a certain minimum size; this, perhaps, may be regarded as a matter of opinion. In Holland, even a town of 20,000 inhabitants is considered rather small for a separate electricity supply undertaking. *The system in Holland, with electric supply companies for entire counties—excluding the very largest cities—is no doubt a development in the right direction.*

Rural Electrification above all a Financial Problem.

Experience has proved that it is only a matter of time for the inhabitants of a rural district to adopt electricity to a certain extent for light and domestic use, as well as for handicraft and small industries. How rapidly this is done will depend upon the economic standard of the population and also to some extent upon propaganda as to the value of electricity for various practical purposes.

The running costs of the electricity supply being, however, normally covered by the eliminated costs of the oil and fuel used before electrification, the development of a rural electrical scheme is really and primarily a question of finding the capital for the initial costs of distribution plant and the consumers' electric installations.

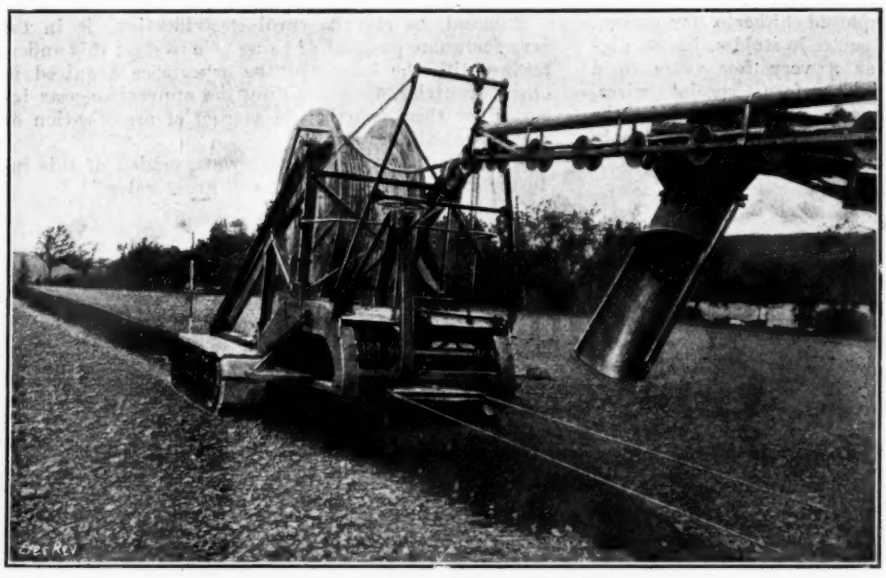


Fig. 4.—The Cable Trailer and Refiller.

In more densely populated areas the supply of electricity for light and domestic purposes can be made a paying business from the start if, as is usually done in America, the electric supply company also provides the consumers with house installations and such apparatus as lamps, &c. This has lately been done with good results in certain towns in England as well.

Similar provision for agricultural consumers in need of such assistance is obviously a more difficult problem. In this case it might be possible to facilitate electrification by introducing a deferred system of payment for machinery, and so on.

Advantages of Larger Electric Supply Undertakings.

Many advantages are obtained by the supply of electrical energy from large units, *especially when it is a question of electrifying an unexploited area.*

As from 70 to 80 per cent. of the cost of electrical energy in rural supply arises from interest on and depreciation of the initial building costs, it is of great importance to keep these costs as low as possible. Standardisation and the systematic development of a large scheme, whether for the building or future upkeep of lines, transformer stations or home installations, must therefore be taken into special consideration. A striking illustration of this with regard to the building of transmission lines may be quoted from Germany.

When using underground cables for transmission at from 10 to 30 kV, a large outlay is incurred in the manual labour for digging the trenches, laying the cable, and afterwards filling the trenches. A gang of 60 to 100 workmen, working eight hours a day for five days, will probably be able to lay one mile of cable.

In Germany, there has lately been constructed a highly interesting and novel machine by means of which six workmen can do exactly the same work in about two days, and at the same time bury the cable to a 25 per cent. greater depth. In fact, by laying the cable with such a machine the costs are reduced by about 85 per cent. For this purpose a purely lead armoured cable is used, the apparatus treating the cable very carefully and the latter being placed at a depth of 1¼ yd., where it is out of reach of agricultural work in the field. The digging machine is placed on a caterpillar tractor together with a Diesel engine of 45 h.p. for driving the machinery, see figs. 1 to 4. The cable drum is placed on the caterpillar transport car behind the motor car. The cable, running from the transport car on a track of wheels, is immediately covered over by the earth which is transported from the digging machinery on a conveyor belt and pressed down by the transport car immediately after it has been dropped into the trench.

With this combination, 30 miles of 20-kV cable were recently laid by a rural supply company with the most satisfactory results, and the company has decided this year to lay down 300 miles of cable.

The cost of a 10-30-kV transmission line of underground cable, when a machine of this kind is used, seems to be not relatively higher than that of a similar overhead-line—supposing such a line were to be built aggregating about 1,000 miles—in view of the advantages offered in the supply of energy through underground cables instead of overhead lines.

On the other hand, there can be no advantage in using such machinery for laying only 10 or even 100 miles of underground cables. It is quite a different matter when it is a question of electrifying a whole county, with cable lines totalling a thousand miles or more. In such a case it is worth considering whether the employment of underground cables instead of overhead lines is not economically justified when the soil is suitable for using digging machinery.

In connection with the necessary management for electricity supply, a large undertaking has many advantages which ought to be emphasised. We have already mentioned the benefits gained by keeping a capable managing staff. This is essential not only for all extensions of the plant and its technical upkeep, but also for an effective and systematic control of the consumers' installations by the supplying company before these are connected to the mains. This affords a guarantee that all electrical devices, fittings, &c., used in the whole area will be of standarised construction. The cost of management can also be considerably reduced for a large undertaking by the introduction of book-keeping and debiting machinery systems.

The successive changes of transformers, electrical devices, &c., on increase or decrease of consumption,

can be carried out economically when the distribution is made over a large area.

In fact, for the efficient management, upkeep and development of a rural scheme, electrification by a large undertaking without any unnecessary intermediaries must be regarded as essential.

The Importance of Systematic Wiring and Suitable Installation Material for a Farm.

Rural electrification demands quite other methods of distribution and installation than are suitable for towns. This has not been generally realised, even in prominent technical circles, and has also led to many serious and expensive mistakes. An interesting example presents itself in the wiring of farms.

For many years the standing principles for the wiring of a factory were applied to farms, and even now, installations on farms are being made which are quite unsatisfactory from a technical point of view.

It is found that the humidity of the air in the stables and lofts on a farm, the changes in temperature, and the ammonia gases from the animals corrode the conductors and devices if these are not properly protected. Measurements and tests carried out prove that, with the methods generally employed hitherto for wiring, the insulation resistance of cables in stables, barns, pigsties, &c., is reduced after a very few years to a dangerously low value. Therefore, special wires, devices, and lighting fittings must be provided for the severe conditions usually prevalent on a farm. Only in dry localities, where there is no danger of fire, can the old wiring system be used.

A careful and systematic study of this question has led to the adaptation of certain principles for the wiring of a farm, as well as a suitable system of protection with fuses for disconnecting a line dangerously overloaded, in order to reduce the risk of fire, &c.

Indeed, during the last few years, entirely new constructions of cables, connection boxes, switches, lamp-sockets, &c., with airtight connections and capable of resisting corrosion, have been introduced in Germany, Denmark and Sweden, and it should be of interest to discover which of these systems is really to be preferred.

In a humid country like England, this question ought not to be overlooked.

Summary.

In England, where rural electrification is at present in course of preparation on an extensive scale, it is of the utmost importance to work out systematic plans for each county separately and in connection with each other, with due consideration to the prepared national scheme.

Before concessions are granted to electricity supply undertakings, the advantages of large units, especially from the economical point of view, should be thoroughly investigated.

England, as regards rural electrification, is in the very fortunate position of being able to start this undertaking with the benefit of the experience acquired in other countries, thus avoiding the apprentice-costs incurred by them, whether in respect of organisation or real technical questions.

A thorough study of the present position of this industry in Europe is therefore of great value.

The New Radio-Telegraph Convention.

Notes on the Convention drawn up by the International Conference recently held in the United States.

By Lieut.-Col. CHETWODE CRAWLEY, M.I.E.E.

THE International Radio-Telegraph Conference which was held last autumn at Washington, U.S.A., was attended by 346 representatives from 79 countries: besides Government delegates, the representatives included members of various bodies not connected with the Governments, such as Associations of Shipowners, Chambers of Commerce, amateur radio organisations, and the International Federation of Radio-Telegraphists. The admission of representatives of such outside bodies and of the Press was a departure from precedent, but was in harmony with the modern tendency towards open discussion in international affairs.

French was, as usual, the official language of the Conference, but it was the first telegraph conference at which members, on request, were allowed to speak in English, their speeches being at once translated into French.

The International Convention and General Regulations, the text of which has been published by the American Government, were signed by all countries, but the Supplementary Regulations (which deal with tariffs, certain procedure signals, and the application of the Telegraph Convention) were not signed by the United States, or Canada, as their Governments are not members of the Telegraph Union. A somewhat similar arrangement was made at previous conferences, but no difficulties arise in practice, as the operating companies observe the rules laid down.

There was a good deal of discussion as to the basis on which votes should be allotted to the various countries, but it was eventually decided to let this matter stand over for the next Conference. No country is obliged to enforce any decisions of the Conference until the Convention has been formally ratified by its Government, but it may be assumed that the Convention will come into force generally on January 1st, 1929.

Allocation of Waves.

The allocation of waves for radio communication and experimental work was the most important, as well as the most difficult, matter with which the Conference had to deal. Waves for ships' services only, and those under very limited conditions, had been dealt with at the last Conference in London in 1912, but this time fixed services, aircraft services, broadcasting services, and experimental services (amateur and commercial) had to be considered in addition.

Waves between 30,000 and 3,000 metres have been assigned to fixed services, that is, services between fixed stations, and waves between 3,000 and 5 metres have been assigned in definite bands to all the various services; the band ranging from 3,000 to 1,875 metres is for mobile services, that is, ships, aircraft, &c., 3,000 to 2,755 metres being shared with fixed services; the 2,400 to 2,000 metres band is exclusively for ships' services, and that of 2,000 to 1,875 metres is shared with fixed services and broadcasting services.

The 1,875 to 1,550 metres band is to be used in Europe for broadcasting services only, that from 1,550 to 1,340 for broadcasting and air services, and that from 1,340 to 1,050 for air services only.

Waves of from 1,050 to 545 metres are assigned to mobile services, those of from 950 to 850 being for air

services only, and the ships' distress wave remaining as at present on 600 metres; waves from 545 to 200 metres are for broadcasting services, with the exception of the ships' wave of 220 metres for use in small ships. Waves from 200 to 5 metres are split up into bands for all services: six bands below 100 metres are assigned exclusively to broadcasting services, and five bands exclusively to amateur services, which have, in addition, a sixth band shared with fixed and mobile services. The remaining 25 bands have been assigned to fixed or mobile services, or to both in some cases. The band 10.7 to 13.1 metres has been left unreserved.

No comprehensive allocation of waves could completely satisfy all interests, but anyone who has studied the matter must be gratified to find that it has been possible for an international conference to arrive at so satisfactory a solution of a most difficult technical problem, in which every nation, indeed every interested party, had necessarily to make sacrifices in one way or another. It should now be possible for all services to develop in a way which would have been quite impracticable without a reasonable international allocation of waves.

Qualifications of Operators.

No special qualifications are laid down for operators at fixed stations, as it is so much to the interest of the employing administrations and companies to maintain competent operation that international standards are unnecessary. In the case of mobile stations, however, distress working is of international importance, and since the early days of wireless communication international standards for the qualifications of ships' operators have been in force.

In this country it has been the rule that a ship's operator must have had at least six months' operating experience at sea before being eligible to take sole charge of an installation, even on board the smallest ships. The Convention does not require any operating experience for taking charge in small ships; it lays down, however, that the operator in charge on a ship which keeps a permanent watch must have had a year's experience at sea, or in a coast station, and in the case of ships which keep a regular daily watch of at least eight hours, six months' experience will be required. These periods are less than those at present required in the case of British ships, but previous international conventions stipulated no period at all.

The qualifications required for an operator's certificate have been raised: the speed of operation laid down for a first-class certificate is 25 words a minute, and for a second-class certificate 20 words a minute, as compared with the present 20 and 12. Small ships which are not compelled by law to carry wireless apparatus can employ an operator with a lower-grade certificate, called a "Special Certificate," but even in that case an operating speed of 20 words a minute is required. These new standards should assist in improving the working of ships' radio communication, a matter of importance not only for traffic purposes, but also for the more important purpose of safety of life at sea.

The certificates of proficiency for aircraft operators are on the same lines as those for ships' operators, a knowledge of aircraft apparatus being substituted for ships' apparatus. Certificates issued under former regulations will remain valid for those operators who are able generally to meet the new requirements. A certificate for radio-telephone operators has been introduced internationally for the first time. Such operators can only be employed for radio-telephone service on ships, or aircraft, whose installations are less than 300 watts input.

Distress Signal.

The distress signal remains as before, SOS, but all the procedure in connection with distress messages has been amplified in the light of experience gained since the last Convention. It is laid down now that distress signals, and repetitions of such signals, can only be made on the authority of the person in charge of the mobile station, and that when the distress signalling is finished a general communication to that effect must be made. Measures to prevent the transmission of false, or deceptive, distress signals will be taken by all Governments which sign the Convention. Provision has been made, too, for distress calls by radio-telephony, the call to consist of the spoken expression "Mayday" (*i.e.*, m'aider).

Recently an automatic alarm signal has been introduced in British ships to precede the distress signal, and by the Convention this signal will now be recognised internationally. It consists of a series of twelve dashes sent in one minute, the duration of each dash being four seconds and the intervals between dashes one second. Special receiving apparatus* can be fitted which will automatically respond to this signal and ring a bell to call the operator to the instruments. This arrangement will obviate the necessity of carrying watchers whose duty was to summon the operator when they heard a distress signal, a form of watching which proved unsatisfactory in practice.

Spark Transmission.

The Convention has confirmed the general practice of prohibiting spark transmission for intercommunication between fixed stations, and has made important rules regarding the use of spark transmission for ships' communication. No new spark installations are to be permitted in coast stations; existing ones are to be converted to continuous-wave sets as soon as possible, and in any case not later than January 1st, 1935. The conversion of the spark sets at our coast stations has been in hand for some time, and two of them are already working on the interrupted-continuous-wave system. In ships and aircraft no new spark installations exceeding 300 watts are to be fitted after January 1st, 1930, and all existing installations which exceed 300 watts are to be converted by January 1st, 1940. All these limitations as regards spark sets have, of course, been imposed in favour of broadcasting interests, as spark signals are the most suitable technically for the distress working of ships. As regards reception, it is laid down that all ships must be fitted with continuous-wave receivers by January 1st, 1932; in other words, crystal receivers on ships are to be abolished by 1932.

The use of the ships' waves of 300 and 450 metres has been curtailed, which has been the practice so far as British ships are concerned for some time, but a good deal of interference with the broadcasting service has continued to be caused by foreign ships using these waves near our coasts. The Convention lays down that the 300-metre wave must not be used for traffic between 6 p.m. and midnight, or at any time after January 1st, 1930; it may, however, continue to be used by fishing vessels for taking bearings from one another, provided that no interference is caused to broadcasting. The use of the 450-metre wave is prohibited in any area where it might interfere with broadcasting.

International Technical Committee.

An International Technical Consulting Committee on Radio-Communication is to be established and charged with the study of technical and allied subjects relating to international radio-communication which may be submitted to it by Administrations or private enterprises. The Netherlands Administration has been charged with organising the first meeting.

Arbitration.

Compulsory arbitration is a new feature of the Convention. In case of disagreement between two contracting governments regarding the interpretation, or execution, of the Convention or its Regulations, the question must be, at the request of one of the governments concerned, submitted to arbitration.

Next Conference.

The next International Radio-telegraph Conference has been arranged to take place in Spain in 1932.

* See ELEC. REV., August 26th, 1927.

The Management of the N.R.E.I.C.

An Examination and Criticism of the Register's Accounts.

By E. ARTHUR PINTO, A.M.I.E.E., Registered Installation Contractor.

THE cognate questions of shoddy wiring and registration are now receiving considerable attention and a number of useful criticisms have been put forward, notably in the articles by Mr. H. R. Taunton in recent issues of the ELECTRICAL REVIEW. Mr. Taunton and other writers, however, appear to be aiming at what may be termed external ideals without making any serious attempt to probe into the real cause of the hitherto deplorably feeble conduct of the National Register of Electrical Installation Contractors. The present article, therefore, deals with the internal affairs of the Register so far as they can be gauged from the meagre information available to registered contractors.

As long ago as April, 1925, the writer attempted to obtain a copy of the N.R.E.I.C.'s accounts. After various rebuffs, these were received, but were accompanied by a letter from the secretary, which contained the following remarkable statements:—

"I have no authority to circulate the accounts to others than the members of the Register. Registered contractors are not members of the Register. However, on the understanding that you treat it as confidential and use it only for the purpose of discussion with Mr. X and myself, and not otherwise, I enclose a copy."

(The gentleman whom I have described as Mr. X is a well-known contractor and a representative of the E.C.A. on the Register.)

Being thus pledged to secrecy, I had to be content with the private discussion referred to. In spite of protestations of the Register's anxiety to do its job, little improvement, if any, has appeared. Complaints of inefficiency, and even of discourtesy to registered contractors, are heard from time to time, and even more would come to light were not contractors so disgusted with the present *régime*. The author, returning to the attack, last month asked an official at E.C.A. headquarters to obtain for him a copy of the last accounts. He replied:—

"I am informed that the balance-sheet is subject to the criticism of the founding bodies of the Register and not open to criticism on the part of registered contractors themselves."

Application was then made to the E.C.A. representative referred to above. All he could do was to forward the request to the secretary, whose reply was to the effect that the Executive did not see its way to supply a copy of the accounts, "as it would create a precedent which might be found irksome if other applications of a similar character were made." Mr. Trimnell suggested that the E.C.A. would allow the writer to inspect the copy which it had, being a founder member.

One's curiosity was now thoroughly aroused as to the contents of a document so well protected from public gaze, and a further application, addressed to the secretary of the E.C.A., at last brought a copy of the accounts, the precious sheet of paper being sent *by registered post*! This time, no condition of secrecy was imposed. It is felt that this persistence is justified by the figures now to be disclosed, which reveal, in the writer's opinion, a most unsatisfactory state of affairs. The figures dealt with below are for the year ended December, 1926.

The *income* side showed receipts from the issue of 242 certificates amounting to £1,014. Renewals of 766 certificates produced £758, whilst the sale of electros, &c. (£80) and interest on investments (£109) brought the total income up to £1,961.

It must be remembered that a large proportion of the entrance fees (£1,014) should be regarded as capital, and £707 has rightly been transferred to capital account, which appears to stand at about £2,800. This influx of capital will gradually dwindle, and on the present basis of subscriptions the income to be looked for is in the region of from £1,200 to £1,400. But this figure will never be reached or maintained unless the Register retains the confidence of the contractors who find the whole of the income.

Now let us examine the expenditure, which may be divided under two heads: (*a*) Propaganda, (*b*) Administration, which includes "overheads."

(*a*) Advertising and publicity literature absorbed only £84; printing and stationery (probably part of this should be allocated to office expenses), including dies and stamps, less £80 received from the sale of the latter, amounts to £53. Proportion of postage, say £37. This gives a miserable total of well under £200 expended on new material for propaganda.

(*b*) Administration and overhead expenses:

Salary of secretary	£400
Clerical assistance	289
Rent, heating, light, &c.	78
Office expenses	61
Telephone	11
Audit fee	15
Fares of Executive	40
Balance of postage, say	30
Total	£924

which is almost the whole of the amount received for registration fees during the year, excluding entrance fees. Income tax (21 months) and bank charges absorbed a further £73. It is, of course, probable that stocks of publicity matter already in hand were utilised during the period under review, though the balance-sheet shows no indication of this, but the mere fact that only £67 was spent in postage during the year and that this includes correspondence dealing with subscriptions, certificates, &c., amounting to at least two communications to every registered contractor, shows how very little can have been done to reach the outside world. Yet secretarial and clerical services alone cost £689!

The figures reveal a condition of affairs which no business man could tolerate in his own business. They will probably come as a shock to those contractors who have fondly hoped that their payments to N.R.E.I.C. were being utilised to better purpose. It is very evident that drastic reforms are needed in the internal economy of the Register. To deal with the position, district meetings, on the lines of the E.C.A. branch meetings, should be held and should be attended by representatives of the Executive Committee, and these meetings should be followed by a meeting of delegates from all districts. This should be done before the next annual renewal of subscriptions in April, or the Register may well find that the body of contractors who provide the whole of its funds will not be anxious to provide for the expenditure indicated above. There is not much to cavil at in the constitution of the N.R.E.I.C., and it has in its reach the power to do an immense amount of good. Let it come out into the open and show its hand. If it wants more from the contractors, the funds will be forthcoming, but it must *first* show that it can and will expend these funds to better advantage. In this way alone can it obtain and retain the support on which it exists.

Cable Conductor Losses.

The author has devised a method for readily estimating the conductor losses for the mains, particularly of a bulk supply system, where a two-part tariff is involved.

By C. G. WATSON, M.I.E.E.

PRELIMINARY to the economic reconstruction of a distribution system (with growth in the use of electricity, many old systems have or will have to be reconstructed), the need is felt of having a ready means of evaluating the power lost in the mains under working conditions, taking into consideration the costs of a bulk supply. A method, therefore, which embodies all the important factors should prove useful, and the following scheme is designed to this end.

Taking the almost universal case of copper as the conducting material, and assuming a working temperature of 65 deg. C. (approximately true for cables loaded to their full capacity), the loss in kilowatts is—

$$3\ C^2\ L n / 10^3\ A \quad \ldots\ldots(1)$$

Where C is the current in amperes, L the cable length, A the cross section, and n the effective number of conductors, which is 2 in the case of single phase, either 2-wire or 3-wire with balanced load; and 3 in the case of three-phase, either 3-wire or 4-wire balanced.

As the losses occur at peak load, and as a bulk supply involving a two-part tariff is a basis, it is necessary to take account of the maximum-demand charge as well as of the unit charge. Therefore, one part of the total value of the loss will be the loss at the system peak multiplied by the cost per kilowatt of maximum demand. But as the maximum load of a cable does not always coincide with the system peak, and as it is convenient to use the maximum current as a basis for calculation, a correction factor is needed. This factor is the square of the ratio between the current in the cable at the time of the system peak, and the maximum current. Calling the ratio r_1, and the cost per kilowatt of demand a, the charge on account of maximum demand is—

$$3\ C^2\ L n \times r_1^2\ a / 10^3 A \quad \ldots\ldots(2)$$

The charge on account of units consumed is proportional to the mean square of the loading throughout the year, and to the cost per unit. But much wearisome calculation is needed in order to arrive at the exact value of the mean square in any given case. An approximate figure, however, can be obtained simply from the load factor.

Calling the ratio of the mean square to the square of the maximum current r_2, and the cost per unit b, then the charge on account of units lost in a cable is—

$$3\ C^2\ L n \times 8{,}760\ r_2\ b / 10^6\ A \quad \ldots\ldots(3)$$

Adding the two charges together, and allowing for the unit charge being in pence, the total charge for loss is—

$$V = 3\ C^2\ L n\ (r_1^2\ a + 36.5\ r_2\ b) / 10^3\ A \quad \ldots\ldots(4)$$

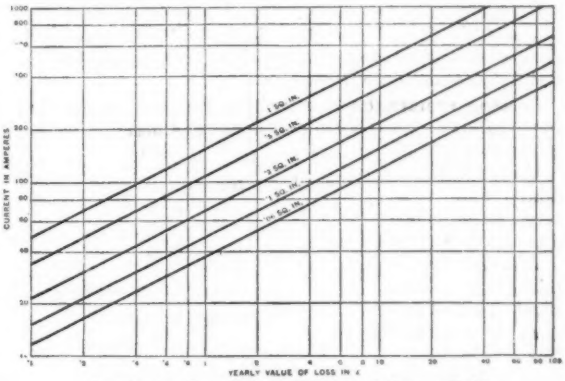
where V = yearly value of loss in pounds,
C = maximum current in amperes in each conductor,
L = length of cable in yards,
n = effective number of conductors,
A = cross sectional area of each conductor in sq. in.
a = cost in pounds per year per kilowatt of maximum demand,
b = cost per unit in pence,
r_1 = ratio of current in cable at system peak to maximum current,
r_2 = ratio of mean square current throughout the year to maximum current squared.

It is impracticable to make a rule to determine r_1, as the working conditions vary so greatly that the maximum value may be unity, as often it is, and the minimum value zero, although such a value is rare; but it may readily be calculated from the log sheet. As to r_2, its value may be taken as $(f+f^2)/2$, where f is the load factor expressed in terms of unity.

With energy at £5 per kilowatt of maximum demand per year and 0.3d. per unit, where the maximum current coincides with the system peak, and a load factor of 25 per cent., formula 4 resolves into $C^2\ L n / 5 \times 10^6\ A$, which is easy to use and is generally applicable.

For more ready use, graphs may be plotted; the one illustrated is for a 100-yd. length of 2-core cable at 30 per cent. load factor. The prices taken in this case are those given above, and r_1 is taken as unity.

The results reveal that a bulk supply, with its definite penalties on inefficiency, introduces a new and an important factor into the design of distributing systems.



Conductor Losses for 100 yd. of 2-core Cable.

To take an example, consider the case of an area of less than 200 yd. square, which is fed by five 0.4-sq. in. two-conductor cables, each carrying 500 amperes at 200 volts an average distance of 600 yards, with a load factor of 35 per cent. and the maximum load coincident with system peak. Substituting the appropriate values in formula 4, the yearly value of the losses, taking £5 and 0.3d., is seen to be £855. Capitalise this figure at, say, 7 per cent., and there is enough to buy a site, build and equip a sub-station, lay new l.p. feeders, and tap a h.p. feeder, or even lay a new one, and still leave something to spare. Another example, drawn, like the preceding, from practice, is the case of 2,500 kVA sent 2,000 yd. at 1,000 volts along eight 0.25-sq. in. cables, with a load factor of 25 per cent., and the other factors as before. In this case, the yearly loss, calculated from $C^2\ L n / 5 \times 10^6\ A$, amounts to £2,500. And what could not be done to improve the efficiency with 20,000 volts, or even 6,000 volts, for the capitalised value of £2,500?

The Inductaphone.

New methods of wrapping cables, which make it possible to hear sounds from under water by induction, were demonstrated at Chicago by Mr. Charles R. Withers, an electrician. The inventor said the Navy Department had agreed to test the device, which is called the Inductaphone. At a demonstration of the invention for the United States Coast Guard, Mr. Withers submerged a cable to which were attached automatic sending and receiving sets; another cable, dragged through the water over the submerged one, picked up messages from the set by induction.—*Reuter's Trade Service* (Chicago).

The South-East England Electricity Scheme, 1927.

Adoption of the Amended Project.

LAST Friday, February 17th, the Central Electricity Board published the South-East England Electricity Scheme in the form in which it has been adopted after consideration of representations made by interested parties, and some independent inquiries of its own.

The adopted form differs considerably from that in which the Commissioners submitted the scheme last October (ELEC. REV., October 7th, 1927, p. 604). The most striking difference is a large increase in the number of "selected" stations. The Commissioners named 13 existing stations and five proposed new stations. The Board names 31 existing stations and four proposed new stations. The dropped new station is that at Chiswick, the subject of the Act of 1927 obtained by the London Joint Electricity Authority. The Act authorises the purchase of the Duke's Meadow site only if the station is classed as a selected station, so that it appears that the J.E.A.'s powers over it now lapse.

In an explanatory memorandum, the Board states that having found that the Fulham Borough Council's station is capable of advantageous extension, and that some other riverside stations are similarly available for economical development, it considers that such extensions will for the present take the place of the proposed Chiswick station.

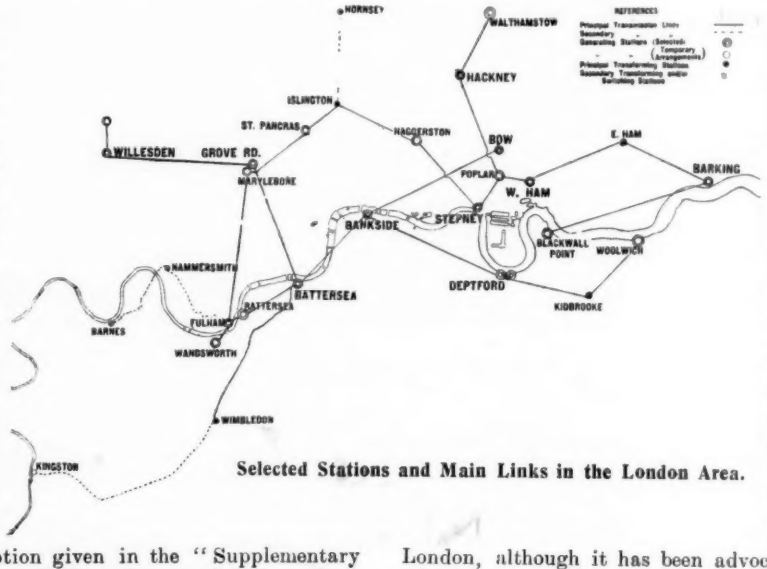
This memcrandum also states that on inquiry and consideration of later statistics than were available to the Commissioners, the Board regards the estimates of the growth of consumption given in the "Supplementary Particulars" as more likely to be exceeded than otherwise in the near future, and for this reason has decided to list the larger number of selected stations.

This change makes all the important stations in the London area "selected." Most of the new selections are transfers from the Commissioners' list of stations to be available—during the progress of the works of the scheme—to supplement the selected stations; and conversely the Board's list of stations for such supplementary purposes is reduced to eight, against the Commissioners' 30 (see next page).

Another change of some importance is the omission from the body of the Order of the requirement on the owners of certain selected stations to carry out the extensions and alterations specified in Part II of the Second Appendix, and the consequential omission of that part of the Appendix. The Board states in the Memorandum that it thinks it better to retain complete flexibility and to call for such extensions and alterations as experience of the growth and location of consumption shows to be necessary. The Board has power to require such extensions, subject to the approval of the Commissioners, and to arbitration if the owners object on financial grounds.

The Board has rewritten Section 5 of the Scheme relating to the prices which may be charged to and by the Board for supplies in either direction under "Temporary Arrangements." The Commissioners specified these prices in terms which excited some comment, for they might have been less favourable to the owners of the stations than the terms set out in the Act of 1926 for selected stations. It was also objected that the Commissioners had exceeded their powers in specifying any terms. These comments have been met by the Board, the new Section 5 providing that the terms shall be by agreement, with recourse to arbitration if necessary. The period of "Temporary Arrangements" is defined by the Board as "during the carrying out of the works specified in the Third Appendix hereto," *i.e.*, the construction of the main transmission lines, which is more definite and presumably shorter than the Commissioners' "during the carrying out of the works specified in the scheme."

One consequence of the alteration in the "selected" list is that all the important stations in the London area are included; so that substantially the whole generation of electrical energy in London will come under the "load dispatching" control of the Central Board. It will hardly be disputed that this control is an essential condition of generation at the lowest over-all costs. It is notorious that there has been continuous and powerful opposition to such control on the part of many authorised undertakers in and around London, although it has been advocated by competent advisers for the last quarter of a century.



Selected Stations and Main Links in the London Area.

Another consequence is that the Board will start with a considerably larger volume of business, since the owners of all selected stations are required to buy from the Board all the output needed for their own undertakings. The date at which selection becomes effective is not defined in the scheme; until that date selected stations, as well as those listed for supplementary uses, are subject to work under "Temporary Arrangements." The completion of the main transmission lines will mark the end of the temporary arrangements; and it seems reasonable to suppose that as the various links of the "grid" are completed, selected stations will be transferred from the temporary to the permanent arrangements. Apparently the Board will be free to make the change in sections as circumstances dictate.

The maps and lists of main transmission lines show considerable changes from those of the submitted scheme. The most prominent are those in the London area, which shows interlinking mains between the more numerous selected stations.

The "Supplementary Particulars" issued by the Commissioners contained estimates based upon the

smaller number of selected and larger number of supplementary stations, and will consequently not be directly comparable with the working of the modified scheme. From the explanatory Memorandum it is also evident that the Board expects that the growth of consumption will be more rapid than is assumed in that pamphlet.

It is noteworthy that the Board has made these considerable modifications of the scheme without recourse to the public inquiry for which some parties called. This is perhaps a matter for congratulation, for such an inquiry might have been both costly and protracted. It is well known that very numerous representations and objections were made to the Board, and that there have been numerous interviews with the parties, many visits to stations, &c. Probably the owners of the stations which have been transferred to the "selected" list will be satisfied so far. The status conferred has some material advantages, and it cannot be withdrawn without the owners' consent. It is likely enough that in the course of years some of the selected stations will become out of date in the economic sense, but this need not mean any sacrifice to the owners, nor indeed to the Board or the general body of consumers, as a consequence of the scheme. Without the scheme, or some equivalent plan of co-operative and interlinked operation, the loss would be at least as great, and spread over a smaller area.

It will be apparent that this scheme may raise questions as to the position and duties of the London Joint Electricity Authority, and some other positions due to the special electrical legislation for London. But tactful and diplomatic conduct of the Board will go far to solve such questions amicably, and, so far as can be judged by the adopted scheme, the Board has made a good show of these qualities.

The Scheme has been published through H.M. Stationery Office, price 2s. 6d. net; it contains, as before, a map showing the whole area affected by the scheme, with the generating stations of both "selected" and "temporary" descriptions, the principal and secondary main transmission lines, and the transforming and/or switching stations. Some of the changes in the routes of the main lines appear to have been designed with a view to constituting additional "ring" mains where possible. Another map shows the London area on a larger scale; the principal features of this map are reproduced in outline on the previous page.

TABLE I.

Comparison between the scheme submitted by the Commissioners and the scheme adopted by the Board.

Selected Stations.

COMMISSIONERS' LIST.	ADDED IN ADOPTED SCHEME BY BOARD.
Existing 13—	*Existing* 18—
Bankside (City Co.)	Battersea Borough Council.
Barking (County Co.)	Blackwall Point (South Met.)
Bow (London Power Co.)	Brimsdown (Old) (North Met.)
Brighton	Croydon
Brimsdown (New) (North Met.)	Gravesend
Deptford East (L.P. Co.)	Ipswich
Deptford West (L.P. Co.)	Luton
Grove Road (L.P. Co.)	Poplar (New)
Hackney	Shoreditch
Peterborough	St. Marylebone
Stepney	St. Pancras
Willesden (L.P. Co.)	Walthamstow
West Ham	Wandsworth (County Co.)
Proposed new five—	Willesden (North Met.)
Battersea (L.P. Co.)	Woolwich
Chiswick (London J.E.A.)	Bedford
Little Barford	Fulham
Station A, in east of area	Maidstone
Station B.	*Proposed new four*—
	As in Commissioners' list, excepting Chiswick.

"Temporary Arrangement" Stations, other than "Selected."

COMMISSIONERS' LIST.	
Aylesbury	Reading
Wandsworth	St. Marylebone
Battersea	St. Pancras
Bedford	Shoreditch
Blackwall Point	Tunbridge Wells
Brimsdown (Old)	Twickenham
Willesden	Walthamstow
Colchester	Watford
Croydon	Wimbledon
Fulham	Woolwich
Guildford	
Gravesend	BOARD'S LIST.
Hammersmith	*Adopted scheme.*
Hastings	Colchester
Ipswich	Guildford
Kingston	Hastings
Luton	Kingston
Maidstone	Poplar (Old)
Poplar (New)	Reading
Poplar (Old)	Tunbridge Wells
	Watford

Business and Industrial Notes.

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations and Failures.

The E.D.A. Circle Campaign.

On February 13th a dinner of the S.W. & S. Area Circle took place at the Black Horse Hotel, Kidderminster. The attendance of electrical installation contractors numbered about 70. The chair was taken by Mr. J. T. H. Legge, chief engineer and manager of the Shropshire, Worcestershire and Staffordshire Electric Power Co., who is also chairman of the Circle. The toast of "The Circle" was proposed by Mr. T. Pugh, Kidderminster, and was responded to by Lieut.-Col. W. A. Vignoles, D.S.O., M.I.E.E., director of the B.E.D.A. The chief guest was the Mayor of Kidderminster, Mr. E. G. Eddy, M.B.E., J.P., who very ably proposed the toast of "The Electrical Industry." Mr. W. G. Bond, managing director of the Power Company, replied. The toast of "The Guests" was proposed by Mr. E. E. Hamar, of the Power Company, who is hon. secretary of the Circle, and the response was by Mr. R. A. Chattock, city electrical engineer, Birmingham. The chairman's health was proposed by Mr. C. E. Abell (Messrs. Abell & Smiths Electrical Co., Worcester). The Merry Optimist Party provided a concert.

The Marking of Imported Pottery.

The report of the Standing Committee of the Board of Trade regarding the marking of imported pottery has been published by the Stationery Office (3d. net). The Committee recommends the making of an Order to provide for the marking of several kinds of ware, but is of the opinion that the Order should not apply to the comparatively small importation of electrical ware as it would result in some injury to the trade in electrical accessories.

Representation in Cuba.

In the course of a report upon conditions in Cuba (Stationery Office, 1s. net), Mr. L. C. Hughes-Hallett, Acting Consul-General, Havana, deals with the question of representation. He says that the Cuban market requires the appointment and careful selection of agents, and any attempt to compete by correspondence alone is doomed to failure. It is sometimes necessary for the agent to be allowed considerable latitude in arranging terms of payment. Conditions in this market change quickly, and the personal attention of a competent agent is essential if orders are to be secured.

Municipalities and Foreign Plant.

In last week's *Manchester Guardian Commercial* Mr. R. Lomax, the Stockport electrical engineer, replied to statements made in the B.E.A.M.A. pamphlet on "Municipalities and Foreign Plant." This pamphlet, as was mentioned in our issue of February 10th (p. 236), aimed at showing that the municipalities who had installed foreign generating plant were actually losing money instead of achieving a saving. Mr. Lomax says that these conclusions were based purely on thermal efficiency, which is a false method of comparing the real value of generating plant. He maintains that a much more strictly comparable basis is that of total running costs plus capital charges. "Here every detail is included, and while, it is true, the variable human factor is not removed, its influence is not out of proportion, as it certainly is in comparing fuel costs alone."

Local Exhibition.

IPPLEPEN (CORNWALL).—An electrical exhibition was held from February 9th to 11th by the Torquay electricity undertaking, in co-operation with Newton Abbot contractors, at the Church Schools, Ipplepen. At the opening ceremony, the chairman of the Electricity Committee and the electrical engineer (Mr. H. F. G. Woods) addressed the company on the policy of the Torquay undertaking with regard to supplies in rural areas. Mr. Francis, of the Electrical Development Association, later gave two lectures on the "Uses of Electricity in the Home." Cookery demonstrations were given by the British Electric Transformer Co., Ltd., and resulted in applications for the hire of cookers and other apparatus. The undertaking intends to give exhibitions of a similar nature as the supply is extended further afield.

Calendar.

What we should believe to be the last of the 1927 calendars has been received from VICTORY VALVES, LTD., Stockport, through Messrs. Judd, Pratt & Co., Ltd., Abbey House, Victoria Street, S.W.1. It bears a picture of the *Victory* and a block of daily slips.

New Municipal Showrooms and Offices.

The Preston Corporation has received the sanction of the Electricity Commissioners to the borrowing of £14,000 for the purchase of premises Nos. 40 and 41, Lerne Street, for electricity showrooms and offices.

A new showroom was formally inaugurated at Rawtenstall by the Mayor on February 15th.

Social Events.

The inaugural dance of the newly-formed Pirelli-General Cable Works Social and Sports Club was held at the Royal Pier Pavilion, Southampton, recently, and about three hundred were present. Mr. G. Martinez, director and general manager of the company, and many heads of departments attended. The "Ariste" band provided an excellent programme, and the distribution of carnival novelties added to the general gaiety. Mr. A. C. Woodley carried out the duties of M.C. The first of a series of whist drives following the dance was held at the Club Hall on February 10th, when Mr. A. C. Woodley again carried out the duties of M.C., being ably supported by the stewards, Messrs. Hale and Wyeth.

The recently-formed Philips Social and Sports Club (Philips Lamps, Ltd.), held an inaugural dance at the Portman Rooms, W., recently. Several sub-committees have been appointed for the purpose of forming sub-sections of the club for cricket, football, tennis, &c.

The annual social and dance of the Kirkcaldy Electricity and Tramway Departments was held on February 16th. Provost Kilgour presided. The billiards cup was presented to Mr. A. Ireland, and a cup, presented by Mr. Francis, engineer, for dominoes, to Mr. G. McLeish.

Unemployment.

There was a reduction of 6,740 in the number of unemployed during the week ended February 6th. At that date the total was 1,162,200, as compared with 1,168,940 on January 30th, and 1,303,493 on February 7th, 1927.

Trade Announcements.

Mr. STANLEY SCHREIBER, of the Importers and Distributors, Ltd., states that he has relinquished his position with this company and has founded a new "non-combine" company, under the style of "National Lamps," 92, Turnmill Street, E.C.1.

Messrs. EDWARD HOLME & Co., LTD., Altrincham, announce that Mr. William Rea has been re-appointed as their sales manager.

MESSRS. COURTNEY, RUSSELL & Co. have removed to larger premises at 31, Fitzroy Square, W.1. (Telephone: Museum 1308.)

The BRITISH B.A.G., LTD., 23, Farringdon Avenue, E.C.4, has appointed the Howard Electrical Co., Ltd., 14, Canal Street, Nottingham, sole agent for its apparatus in the counties of Nottinghamshire, Derbyshire, Leicestershire, and Lincolnshire.

ACCUMULATORS OF WOKING, LTD., has appointed Mr. P. H. Smedley as its representative for the South Midlands and Eastern Counties.

Messrs. W. P. BARNELL & Co., LTD., electrical engineers, have removed their business to 39, Newland, Northampton.

Messrs. CHARLES JOYNER & Co., Icknield Square, Birmingham, have opened a new department for the manufacture of electric cookers, immersion heaters, &c., which will possess a number of special features.

The business of the WEST OF ENGLAND RADIO Co., Barnstaple, has been removed from Cross Street to 67, High Street.

MESSRS. JOHNSON & PHILLIPS, LTD., are terminating the arrangement by which Mr. E. H. Reeves was retained as their advertising consultant, and in future all matters relating to their advertising will be dealt with by their own Publicity Department at Charlton.

Mr. W. H. PRICE has resigned his position as a director of Messrs. W. H. Price & Newey, Ltd., Birmingham. The company has been reorganised, and Mr. A. H. Newey has been appointed managing director.

Messrs. CURRY'S, LTD., wireless dealers, have opened a new branch business at 20, St. Botolph Street, Colchester.

The OMEGA LAMPWORKS, LTD., 83, Merton Road, Wimbledon, S.W.19, states that it has built a new factory with a capacity about six times that of the present works. It is hoped that the new factory will be in full production next month

New Catalogues and Lists.

THE MIDLAND ELECTRIC MFG. Co., LTD., Barford Street, Birmingham.—An illustrated and priced folder dealing with "Kantark" fuseboards for pressures up to 250 V.

THE B.E.N. PATENTS, LTD., 92, Tottenham Court Road, W.1.—A list of users of the company's car washers and a price list of this apparatus.

BROWNS' DRYERS, LTD., 17, Victoria Buildings, Deansgate, Manchester.—A series of illustrated leaflets dealing with the company's portable drills, locknuts, rust preventative, oil heaters, &c.

BRITISH B.A.G., LTD., 23, Farringdon Avenue, E.C.4.—An illustrated and priced catalogue of "B.A.G." diffusers for electric lighting.

THE KIRKSTALL FORGE, LTD., Kirkstall.—An illustrated catalogue of various grades of steel, with data regarding research, heat treatment, and other matters.

WAGNER ELECTRIC SUPPLIES, LTD., 66, Victoria Street, S.W.1.—List No. 30, illustrating and describing "HH" star-delta starters. Priced.

THE FULLER ACCUMULATOR Co., LTD., Woodland Works, Chadwell Heath, E.—A series of illustrated pamphlets dealing with the many types of accumulators made by the company.

SIMPLEX CONDUITS, LTD., Garrison Lane, Birmingham.—An illustrated folder, giving particulars and prices of "Simplex" standard switchgear and distribution boards.

VENNER TIME SWITCHES, LTD., 45, Horseferry Road, Westminster, S.W.1.—List No. 42, dealing with various patterns of time switches, and containing views of towns in many parts of the world in which "Venner" switches have been installed. The publication is fully priced.

MESSRS. D. H. BONELLA & SON, LTD., 46 and 48, Osnaburgh Street, N.W.1.—An illustrated and priced list of automobile lighting fittings, &c.

MESSRS. A. REYROLLE & Co., LTD., Hebburn-on-Tyne.—Pamphlet No. 2, illustrating and describing the company's self-aligning fuses (for pressures up to 660 V); and Pamphlet No. 20, dealing with cast-iron distribution boxes for similar pressures. Both are priced.

THE HART ACCUMULATOR Co., LTD., Stratford, E.15.—A price list of batteries for electric lighting installations.

AUTOMATIC AND ELECTRIC FURNACES, LTD., North Road, Holloway, N.7.—Two illustrated pamphlets containing copies of testimonials from users of "Wild-Barfield" electric furnaces.

GUEST'S BRASS STAMPING Co, Cardigan Works, Belmont Row, Birmingham.—A leaflet containing illustrations of typical hot die pressings for electrical and other purposes.

THE HENDON ELECTRIC LAMP Co., LTD., 104, Southampton Row, W.C.1.—Three illustrated and priced leaflets, dealing respectively with a motor-car radiator heater, heating plugs, and an immersion heater.

MR. PAUL DIENY, 317, High Holborn, W.C.1.—An illustrated and priced pamphlet describing the "Superantenne" aerial.

MESSRS. HEYES & Co., LTD., Water-Heyes Electrical Works, Wigan.—List P.F.7, describing the "Wigan" 100-W watertight industrial prismatic lamp fitting and a folder describing "Wigan" iron-cased specialities.

Bankruptcy Proceedings.

WHITE & Co., electrical factors and agents, 29, Great Pulteney Street, W.—The first meeting of creditors herein was held on February 15th, before Mr. D. Williams, Official Receiver, at the London Bankruptcy Court. The debtor, Mildred White, stated that she was the wife of R. R. J. White, who failed in 1922 when trading as an electrical factor and agent, and that pending his discharge she had carried on a similar business at the same address, at first in partnership with one S. F. Bushell. They were merely nominal proprietors of the business, her husband having sole control and being employed as manager. The partnership with Bushell was dissolved in May, 1924, since which date she had nominally carried on the business alone under the style of White & Co. In November last a writ was issued against the firm by her father, a cash creditor, for £1,000, and, under an execution

which followed, the whole of the stock and effects were sold for about £100, whereupon trading ceased. She was now living apart from her husband, and was entirely without means. In June, 1927, at the request of her husband, she assigned certain book debts to the bankers, the firm of White and Co. being overdrawn to the extent of between £250 and £300. No notice of the assignment had been given by the bank to the book debtors, and recently she assigned the whole of the debts to her father as security for his loan of £1,000 previously advanced to the firm. A statement of affairs was presented showing liabilities of £2,645, against assets valued at £432, the failure being attributed to the heavy overhead charges, which were out of all proportion to the volume of business transacted. A resolution was passed for Mr. W. A. J. Osborne, Balfour House, Finsbury Pavement, E.C., to act as trustee and administer the estate in bankruptcy.

The following are creditors :—

	£		£
Belco, Ltd.	89	I.T.C., Ltd.	90
Barclays Bank	183	Leeds Flint Glass Co., Ltd.	195
Cardew, Smith & Ross ...	52	C. Scott Lindsay	359
Eastick, J. J., & Sons ...	27	Power Contracts, Ltd. ...	20
Electric Lamp Factors ...	21	Sun Electrical Co., Ltd.	105
Fribourg & Freyer ...	30	Spencer, A.	856
General Electric Co., Ltd.	87	Tungstalite, Ltd.	31
Mrs. Hope	150	Wyth, H.	52
Hart Accumulator Co., Ltd.	24	White, J. R., & Co. ...	24

P. CALLAND, 1, Valley Road, Bromborough, Cheshire, electrician.—The public examination of this debtor was held on February 8th, at the Court House, Birkenhead. The liabilities were estimated at £338, and there were no assets. The debtor commenced business in 1923 on his own account. He was without capital, and undertook contracts for electrical engineering work. He lost on three large contracts, which he attributed to advances in the price of materials and wages, and there was no clause in the contracts to cover this. On one contract he lost £50 or £60 through a burglary. His expenses had been increased owing to illness of his family. Debtor first realised his position about nine months ago, and since then had carried on, doing odd jobs. The examination was closed.

J. BRABY, electrical engineer, 93, Chertsey Road, Woking.—The public examination of this debtor was held recently at the Guildhall, Guildford. The deficiency amounted to £275. It was stated that the debtor commenced business on his own account in 1924. His wife advanced him £30. Debtor attributed his failure to bad trade and lack of capital. In 1925 he resorted to a moneylender. He opened a lock-up shop to sell wireless and electrical goods, and stocked it on credit, but the shop did not pay. The examination was adjourned to be closed.

F. A. HARTLEY and R. HARTLEY (F. A. Hartley & Son), electrical engineers, 98, Katherine Street, Ashton-under-Lyne.—Application for discharge to be heard March 30th, at the Town Hall, Ashton-under-Lyne.

E. E. MEARNS, electrical contractor, 14, St. Bedes Road, East Boldon.—Application for discharge to be heard March 15th, at the Court House, 56, Westgate Road, Newcastle-upon-Tyne.

P. LITTON (Moore & Litton), plumber and electrical engineer, 12, Bath Road, and 50, Culverland Road, Exeter.—First meeting February 24th, at the Official Receiver's offices, Exeter Bank Chambers, 67, High Street, Exeter; public examination March 8th, at the Castle, Exeter.

R. P. REEVES (Luxray Spotlight Projector Co.), 5, Say's Corner, North Quay, Great Yarmouth.—Trustee, Mr. C. B. L. Prior, Official Receiver, 9, Queen Street Chambers, Norwich, released February 9th.

C. HUBBARD, electrician, 13, Magdalen Street, Norwich.—Trustee, Mr. C. B. L. Prior, Official Receiver, 9, Queen Street Chambers, Norwich, released February 9th.

J. C. HEALY, electrical engineer, 4, Worsley Terrace, Wigan.—Trustee, Mr. E. D. Symond, Official Receiver, 11, Dale Street, Liverpool, released February 7th.

H. ROBINSON, electrician, wireless dealer, &c., 41, Wigan Lane, Wigan.—Trustee, Mr. E. D. Symond, Official Receiver, 11, Dale Street, Liverpool, released February 7th.

P. CHESHIRE (P. Cheshire & Co.), electrical engineer and contractor, Water Street Works, Middleton, Lancashire.—Last day for proofs for dividend March 3rd. Trustee, Mr. F. Murgatroyd, Official Receiver, Byrom Street, Manchester.

Company Liquidation.

RADI-ARC ELECTRICAL CO., LTD.—A meeting of members is called for March 19th, at the liquidator's offices, St. Lawrence House, Trump Street, King Street, E.C.2, to hear an account of the winding up from the liquidator, Mr. E. James.

Dissolution of Partnership.

H. C. TAPLIN & SONS, electrical and general engineers, 27, South Front, Southampton.—Mr. H. C. Taplin, Mr. N. H. Taplin, and Mr. B. E. G. Taplin have dissolved partnership. Debts will be attended to by Messrs. N. H. and B. E. G. Taplin, who will continue the business under the same style.

The Revised Standard Building Contract.

The Builders' Merchants' Alliance, Ltd., informs us that a meeting has been convened at the Connaught Rooms, W.C.2, for February 27th to consider the revised Standard Building Contract which has been drawn up by the Royal Institute of British Architects and other bodies concerned with building. The Alliance states that under the new form payment by a contractor to a nominated sub-contractor is not due until the employer has paid the contractor. Therefore, a supplier of goods would have to ascertain the financial stability of the employer before granting credit. Moreover, it is claimed that the new form gives no protection whatever to sub-contractors in the event of the failure of the contractor. The object of the meeting is to persuade suppliers of goods to refuse to enter into sub-contracts embodying the terms, and to bring pressure to bear upon the bodies responsible for the purpose of securing amendments. Those desiring to attend are asked to communicate with the Secretary of the Alliance at Finsbury Court, Finsbury Pavement, E.C.2.

Swedish Electric Steel Production.

The papers report that a new company is being founded to exploit the Flodin-Gustafsson methods for the direct electrical production of forgeable iron and steel and stainless iron and steel. The capital of the company, the name of which will be Flodin-Jaern Aktiebolag, is fixed at Kr. 8,000,000 minimum and Kr. 24,000,000 maximum. It is stated that trials of the method at the Uddeholm, Forshaga and Fagersta ironworks have yielded satisfactory results.—*Reuter's Trade Service* (Stockholm).

Recent Contracts.

METRO-VICK SUPPLIES, LTD., has received from the Independent Press, Ltd., Sheffield, an order for the installation of radio apparatus at the Lodge Moor Hospital, Sheffield. The equipment will comprise an 8-valve "all mains" hospital type receiver to operate 350 pairs of headphones and 36 loud speakers. The company has recently completed a similar but smaller installation at the Crimicar Lane Tuberculosis Institution for the Independent Press, Ltd.

INTERNATIONAL COMBUSTION, LTD., has received from Imperial Chemical Industries, Ltd., an order, valued at over £800,000, for the extension of the pulverised fuel plant at the Billingham power station. The contract for the steelwork required in the building has been awarded to Messrs. DORMAN, LONG AND CO., LTD.

MESSRS. JOHNSON & PHILLIPS, LTD., have received orders from the Bay of Plenty and Thames Valley Electric Power Boards, of New Zealand, for a total of 163 outdoor-type, 3-phase distribution transformers, in sizes from 5 to 25 kVA.

BURNLEY COMPONENTS, LTD., reports that the Castleton housing scheme at Rochdale, comprising 192 houses, is to be equipped with its "Burco" electric wash boilers. This is the third housing scheme in that area to be equipped with "Burco" boilers.

Employment in January.

The February *Ministry of Labour Gazette* says that employment in the engineering industry during January remained slack on the whole, although in the electrical section conditions remained fairly good. The percentage of unemployed in the whole of the engineering industry was 8.8, as compared with 8.5 in December last. There was also a rise in the electrical section—from 4.2 to 4.7 per cent. There were increases in the proportion of unemployed in the electrical wiring and contracting industry (from 5.4 to 6.3 per cent) and in the electric cable, wire and lamp manufacturing group (from 4.6 to 5.9 per cent.). The actual numbers of unemployed were as follows :—Engineering, 84,795; electrical engineering, 3,676; electrical wiring and contracting, 901; and electric cable, wire and lamp manufacture, 4,958.

The Czecho-Slovakian Electrical Market.

The Prague correspondent of *British Industries* says that the gradual electrification of Czecho-Slovakia and the increasing building activity provide an outlet for local enterprise. The bulk of the requirements in electrical plant are met by Czecho-Slovak firms, and only special devices and apparatus are imported either from England or Germany. Russia has also contracted for the supply of electrical plant for power stations on a tentative scale. The German A.E.G. has recently taken up a considerable interest in Krizik & Co., one of the largest manufacturers of electrical plant.

Proposed French Tariff Revision.

The alterations in the French Customs duties under the recent Franco-Swiss commercial agreement are embodied in a revision of the tariff which has been placed before the French legislature. The alterations consequent upon the French agreements with Germany and Belgium are also taken account of in the revision. The changes are set out in the *Board of Trade Journal* for February 16th, and it is seen that a number of classes of electrical and allied goods are affected. Generally speaking, the revision of the duties appears to be in a downward direction.

Hungarian Electrical Exports.

During December last, according to the *Board of Trade Journal*, Hungary exported electrical machines and apparatus valued at 1,910,000 pengös (about £68,000).

The Business Efficiency Exhibition.

This exhibition, at Holland Park Hall, was opened by Lord Riddell on February 14th, and remains open until to-morrow (Saturday). A feature of the display is the noticeable increase in the number of electrically-operated office appliances, such as tabulating machines, typewriters, Dictaphones, &c.

The German Electrical Industry.

According to a trade report, a decline in the receipt of orders has taken place in the past few weeks to an extent in excess of the customary seasonal changes. The most affected in this respect is the low-pressure branch, and business has also fallen off in dynamos, motors, apparatus, and installation material. Reserve has also been manifested in the placing of orders for industrial purposes by the coal mines and iron and steel works in Westphalia, by large establishments which usually order complete plants, and by tramways and industrial railways; the cable manufacturing branch has also experienced a curtailment of its activity.

Book Notices.

"The Blue Book Electrical Trades Directory and Handbook, 1928" (pp. 1,428). London: Benn Bros., Ltd. Price 25s. net.—In the 46th edition of this useful work of reference the main features remain unaltered. A great amount of revision has been carried out, and several alterations have been made, including the omission of the greater portion of the Legal Digest, and in its place a Geographical Section is substituted. The introduction of Guide Cards is a new feature, and makes for simplicity for general reference purposes.

"Diesel Engine Design," 3rd edition. By H. F. P. Purday, B.Sc. Pp. xviii+360; figs. 308. London: Constable & Co., Ltd.—In this new edition a number of minor alterations have been made to the text of the previous one, and later references to literature have been added. A chapter has also been added dealing with some recent developments of double-acting engines and supercharging. In the previous editions a hint was given that the conventional method of dealing with accumulated twisting effects in crankshafts was of limited application; a more complete account is now given. The opportunity has also been taken to amplify the previous treatment of the subject of torsional vibrations.

"Laboratory Manual for Automotive Electricity." By Wm. R. Varner, B.S., and Fred C. Smith, A.B. Pp. ix+190; figs. 126. London: Chapman & Hall, Ltd. Price 10s. net.—The book is primarily intended to accompany the electrical section of the textbook "Automotive Construction and Operation," by Messrs. Wright and Smith, but sufficient references have been made to other works to make it a suitable independent students' guide. The work contains the basic fundamental theory and practice upon which automobile electrical units are built, although no attempt has been made to cover the field of repair.

"The Practical Electrician's Handbook, 1928." Editor, H. T. Crewe, M.I.Mech.E. London: S. Rentell & Co., Ltd. Price 2s. 6d. net.—An addition to the new edition of this popular handbook is a section devoted to electricity as applied to marine work, whilst electrical refrigeration is also fully covered in a further section. The standing sections of the work have been brought up to date, and in some cases very materially amplified.

Scientific Papers of the U.S.A. Bureau of Standards, No. 567, "Some Principles Governing the Choice and Utilisation of Permanent-magnet Steels" (5 cents).

"Electricity," by C. J. L. Wagstaff, M.A. (second edition). Pp. xi+250; figs. 136. London: Cambridge University Press. Price 5s.

"The Theory and Practice of Radiology," by B. J. Leggett. Vol. I, "Electrical Theory Applied to Radiology." Pp. xii+238; figs. 187. Price 18s. net. Vol. II, "The Physics and Measurement of X-Radiation." Pp. xi+308; 191 figs. Price 25s. net. Vol. III, "X-Ray Apparatus and Technology." Pp. xi+549; 534 figs. Price 42s. net. Vol. IV in preparation. London: Chapman & Hall, Ltd.

"Electro Farming," by R. Borlase Matthews. Pp. xvi+357; figs. 146. London: Ernest Benn, Ltd. Price 25s. net.

"Electrical Engineering Economics," by D. J. Bolton. Pp. xi+305; figs. 27. London: Chapman & Hall, Ltd. Price 21s. net.

Journal of the Institution of Electrical Engineers. Vol. LXVI. February, 1928. London: E. & F. N. Spon, Ltd. Price 10s. 6d.

"Principles of Electric Power Transmission," by H. Waddicor. Pp. xix+399; figs. 148. London: Chapman & Hall, Ltd. Price 21s. net.

Bradford Wireless Retailers.

A Bradford branch of the Wireless Retailers' Association has been established, with about 20 members as a nucleus, and further applications are being received. The chairman is Mr. S. R. Wright, of Christopher Pratt & Sons, Ltd., electrical and radio dealers (and a member of the Council of the W.R.A.), and the hon. secretary is Mr. A. J. Whenmouth, also of Messrs. Pratt's. There is serious complaint in Bradford of price cutting, illegitimate trading in electrical and wireless goods, and the giving of trade discounts by some factors to people who are not *bonâ fide* retailers.

Catalogues Wanted.

Mr. H. G. WHITE, A.M.I.E.E., has opened business premises at 122a, Leigh Road, Leigh-on-Sea, Essex, as an electrical contractor and radio retailer. He also asks for catalogues, price lists, &c.

New Italian Companies.

Among the electrical engineering and electricity supply concerns recently organised in Italy are La Società Industria Commercio Materiali Elettrici, Genoa, capital 100,000 lire; La Società Lampadine Elettriche Thora, Pavia, capital 50,000 lire; La Società Imprese Elettriche Morosi, Milan, capital 1,550,000 lire; La Società Officine Meccaniche Elettrosiderurgiche, Novara, capital 500,000 lire; La Società Officine Elettromeccaniche Campioni Botteon Piacentini & Co., Milan, capital 30,000 lire; La Società Elettrica Aldo Netti, Orvieto, capital 5,000,000 lire; La Società Idroelettrica dell' Evacon, Turin, capital 1,900,000 lire; La Società Molisana Imprese Elettriche, Naples, capital 4,000,000 lire; and La Società Idroelettrica Belluno, Treviso, capital 50,000 lire.

The Purchase of Foreign Plant.

In a letter issued last week, Mr. C. W. Shipley, chairman of the York Corporation Electricity Committee, replied to the brochure of the B.E.A.M.A. regarding the losses incurred by purchasing foreign plant. He compared the tenders of British and foreign manufacturers for generating plant in 1924 and 1925, as well as the guaranteed and observed running costs, and claimed that: "Whatever loss there may or may not have been due to the thermal efficiency of the York undertaking, it can in no way be attributed to the purchase of a Swiss turbine."

New French Company.

An undertaking has lately been organised in Paris (24, Boulevard des Capucines) with a capital of one million francs and the title La Société de Propagande Urbain et Rurale pour l'Electricité, to encourage the provision and use of electric power in urban and rural districts.

Prices of Raw Materials.

The following prices are only general, and they may vary according to quantities and other circumstances:—

	CHEMICALS, &c.		Price Feb. 2 st.	Fortnight's inc. or dec.
a	Acid, Oxalic	per lb.	5¾d.	...
a	Ammoniac, Sal	per ton.	£60	...
a	Ammonia, Muriate (large crystal)	,,	£52	...
a	Bisulphide of Carbon	,,	...	...
a	Borax	,,	£25	...
a	Copper Sulphate	,,	£25 10s.	...
a	Potash, Chlorate	per lb.	3½d. to 4d.	...
a	,, Perchlorate	,,	5½d.	...
a	Shellac	per cwt.	£13 10s.	...
a	Sulphur, Commercial	,,	£11	...
a	,, Roll	,,	£11	...
a	Soda, Chlorate	per lb.	3d.	...
a	,, Crystals	per ton.	£5 to £5 5s.	...
a	Sodium Bichromate, casks ...	per lb.	3½d.	...
	METALS, &c.			
b	Aluminium, Ingots	per ton.	£105 to £112	...
b	,, Wire	per lb.	1/3 to 1/9	...
b	,, Sheet	,,	1/8 to 2/9	...
p	Babbitts Metal and Anti-friction Metal—			
	Grade I	per ton net.	£208	£10 dec.
	Grade II	,, ,,	£144	£7 dec.
	Grade III	,, ,,	£76	£4 dec.
c	Brass (rolled metal 2" to 12" basis)	per lb.	9¾d.	...
c	,, Tubes (solid drawn)	,,	11¾d. to 1/-	¾d. inc.
c	,, Wire, basis	,,	9¾d.	...
c	Copper Tubes (solid drawn) ...	,,	1/1	...
c	,, Bars (best selected) ...	per ton.	£92	...
c	,, Sheet	,,	£94	...
c	,, Rod	,,	£92	...
d	,, (Electrolytic) Bars	,,	£66 15s.	...
d	,, ,, Sheets ...	,,	£143 10s.	...
d	,, ,, Wire Rods ...	,,	£76 15s.	...
d	,, ,, H.C. Wire	per lb.	9¾d.	...
f	Ebonite Rod	,,	2/3 to 2/6	...
f	,, Sheet	,,	2/8 to 2/6	...
n	German Silver Wire	,,	2/2	...
h	Gutta-percha, fine	,,	6/8	...
h	India rubber, Para fine	,,	1/1½	2d. dec.
l	Iron Pig (Cleveland No. 3.) ...	per ton.	65/-	...
l	,, Wire, galv. No. 8, P.O. qual.	,,	£21	...
g	Lead, English pig	,,	£21	25/- dec.
g	Mercury	per bot.	£21 to £21 10s.	15/- to 20/- dec.
e	Mica (in original cases) small ...	per lb.	3d. to 8/-	...
e	,, ,, medium	,,	4/- to 8/-	...
e	,, ,, large ...	,,	10/- to 20/- & up	...
p	Phosphor Bronze, plane castings	,,	1/3½	...
p	,, ,, drawn bars & rods	,,	1/8	...
p	,, ,, rolled strip & sheet	,,	1/2½	...
p	,, ,, wire...	,,	1/3½	...
e	Platinum	per oz.	£17 15s.	...
d	Silicium Bronze Wire	per lb.	10½d.	...
r	Steel, Magnet, in bars	,,	7½d.	...
n	Tin, Block (English)	per ton.	£227 10s. to £229 10s.	£9 10s. to £10 10s. dec.
n	,, Wire, Nos. 1 to 16	per lb.	3/10	4d. dec.

*For 1 cwt. lots. Special quotations against definite specifications.

Quotations supplied by

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India-Rubber, Gutta-Percha and Telegraph Works Co., Ltd.
g James & Shakespeare.
h Edward Till & Co.
i Bolling & Lowe.
l Richard Johnson & Nephew, Ltd.
n P. Ormiston & Sons.
o Johnson, Matthey & Co., Ltd.
p C. Clifford & Son, Ltd.
r W. F. Dennis & Co.

New Indian Company.

The Development of Industries (India) Co. is the name of a company which has been formed at 135, Prinseps Street, Calcutta, with a capital of 100,000 rupees, to undertake the generation and distribution of electrical energy.

The Stockport Contract.

The contract for a 20,000-kW turbo-generator and auxiliaries which had been tentatively awarded to Messrs. Escher. Wyss and Co. was discussed afresh at last week's meeting of the Stockport Town Council. After a long debate it was decided to rescind the resolution to accept the Swiss tender and to issue fresh advertisements to a specification drawn up by the electrical engineer. A letter from the Swiss firm was read. This was directed at showing that the conditions of Swiss workers were not inferior to those prevailing in this country. Messrs. Escher, Wyss & Co. stated emphatically that they did not quote low prices merely for the "doubtful satisfaction of forcing down British prices." Sir Thomas Rowbotham considered that the Council could not go back upon its decision "without a complete surrender of its honour, dignity and sense of fair play and at the same time doing gross injustice to the firm of Escher, Wyss & Co." He moved an amendment for the confirmation of the original decision, but this was defeated. Sir Thomas thereupon resigned from the Council, of which he has been a member for many years. The rescission of the resolution was passed by 28 votes to 26. Later, it was reported that Sir Thomas had withdrawn his resignation and that a special meeting of the Council would be held on Monday next to reconsider the whole question.

For Sale.

Colne Corporation Tramways Department invites offers for two single-deck, 30-seat tramcars. Newport Corporation Electricity Department invites offers for two 60-kW direct-coupled generator sets, with switchboard and eight battery-charging sets, also about 520 ft. of copper bus-bars, insulators, &c. Salford Corporation Electricity Department has for disposal one 500-kW rotary convertor, transformer and starting panel. St. Helens Corporation Electricity Department has for disposal three water-tube boilers, with superheaters, and one set of Green's economisers. Mr. F. W. Wheatley, of 102, High Street, Poole, invites offers for the whole of the stock-in-trade of P. W. Witham, electrical engineer, 139, Bournemouth Road, Parkstone (in bankruptcy). Darwen Corporation has for disposal one each 150-kW and 300-kW steam dynamos with condensers, valves, piping, &c. (See our advertisement pages to-day.)

Lighting and Power Notes.

Barnes.—REVISION OF CHARGES.—The Urban District Council has decided to reduce the charge for lighting from 4d. to 3½d. per kWh, and for power and heating from 2d. to 1½d. per kWh. It has also been decided to supply electricity for water heating between the hours of 10 p.m. and 7 a.m. at a charge of 1d. for 3 kWh. The new scale will operate from the reading of the meters at the March quarter.

Bedford.—LOANS.—The Corporation Electricity Committee has received sanction to the following loans:—Building, £1,685; plant, £10,197; works consequent upon change-over of system of supply, £8,987. The Committee has recommended that application be made for sanction to the borrowing of £8,180 for mains, extensions, and sub-stations.

Bishopbriggs.—ELECTRICITY SUPPLY.—The Clyde Valley Electrical Power Co. is laying two h.p. cables, carrying energy at 11,000 V, and two relay cables from its sub-station at Bishopbriggs to Messrs. Blackie's new works on the Kirkintilloch Road. A sub-station is also to be erected at the company's works.

Bradford.—LOAN SANCTIONED.—The Corporation Education Committee has received sanction from the Ministry of Health to the expenditure of a total of £2,982 on the installation of electric lighting in various schools.

Bristol.—CHANGE-OVER.—In connection with the change-over of the system of electricity supply from single-phase a.c. to the standard three-phase system, the Corporation Electricity Committee now proposes to proceed with the fifth section of the scheme, which includes the centre of the city, Broad Weir, Temple Gate, and Totterdown, the estimated cost being £26,956. It is anticipated that a further expenditure on capital account of £60,536 will be required to complete the scheme.

Buxton.—NEW PLANT.—Owing to the rapidly increasing demand for electricity for lighting and power purposes the Corporation has applied for sanction to install additional plant at the electricity works, including a 340-kW Diesel engine, at a total cost of £7,400.

Chelmsford.—ELECTRICITY SUPPLY.—At a recent meeting of the Corporation Electricity Committee a letter was received from the Electric Supply Corporation, Ltd., drawing attention to the necessity of coming to some arrangement with regard to the future of the undertaking in order to overcome the difficulties of the present situation, which would be accentuated as the demand upon the plant increased. It intimated that the plant was now fully loaded, and that further sources of supply would have to be found to meet the requirements at the end of the year. A bulk supply would be given under the National scheme in the year 1932, but it could probably be made available by arrangement during the current year.

Cheltenham.—LOANS.—The Town Council is applying for sanction to loans of £23,847 for cables, and £15,657 for sub-station switchgear.

Chichester.—ELECTRICITY SUPPLY.—The Town Council has decided to supply electricity to the ice works at 1.1d. per kWh for a consumption of 50,000 kWh per annum, and at 1d. per kWh beyond, the lighting charges to be at ordinary rates.

Colchester.—LOAN.—The Corporation Electricity Supply Committee is to apply for sanction to the borrowing of £20,000 for mains and services.

Continental.—FRANCE.—A new hydro-electric power station has recently been completed at Liebvilliers in the Department of Doubs by the Société des Forces Motrices, Forges et Visseries de Saint Hippolyte. The power is transmitted at 55,000 V to a transformer station at Bourogne, where it is stepped down to 10,000 V. The transformer installation embraces a number of interesting features, the 55,000-V plant being outdoor and the 10,000-V indoor. The power is conducted from the generating station to Bourogne by two separate copper cables having a sectional area of 25 sq. mm., these being supported by rigid type insulators tested to 150,000 V in fine weather and 100,000 V in rain. The equipment comprises four 2,500-kVA, 55,000/10,000-V, oil-immersed, water-cooled transformers.

La Société Alsacienne de Constructions Mécaniques, of Belfort, has recently completed four 6,300-kVA three-phase alternators for the Poet hydro-electric power station, near Sisteron, of the Société des Forces Motrices de la Durance. The machines are of the vertical-spindle type, and generate electricity at 7,500 V, 25 cycles.

RUMANIA.—A project is under consideration for the establishment of a steam-operated power station at Cluj, Transylvania. The boilers are to be adapted to utilise the low-grade fuel available in the vicinity.

Dartford.—NEW MAINS.—To give supplies to Messrs. Burroughs, Wellcome & Co., and other prospective consumers, the Urban District Council Electricity Committee has decided to duplicate mains, &c., at a cost of £6,000.

ELECTRICITY IN BULK.—The Committee has reported that the annual expenditure in the purchase of electricity in bulk from the West Kent Electric Co., Ltd., will be approximately £14,500 when the Council commences to take the supply, and it is estimated that this will rapidly increase.

Gainsborough.—ELECTRICITY IN BULK.—The Urban District Council is negotiating with the Yorkshire Electric Power Co. for a supply of electricity in bulk. The Council has decided to oppose the Bill of the Lincolnshire Power Co.

Gillingham (Kent).—ELECTRICITY SUPPLY.—The Town Council has decided to extend the Gillingham Green feeder and to erect kiosk sub-stations, at an estimated cost of £2,300.

Glasgow.—SUB-COMMITTEE'S REPORT.—The report of the Special Sub-Committee on the Administration and Working of the Electricity Department, which was abstracted in our issue of February 10th, was submitted to a meeting of Glasgow Corporation on Thursday, February 16th. Altogether 16 meetings were held by the Special Sub-Committee, covering a period from September 9th, 1927, until January 24th last. The Corporation, at the meeting on Thursday, decided to postpone consideration of the report to a special meeting to be held to-day (February 24th). Several letters were read from bodies of ratepayers urging inquiry into the administration of Corporation departments. Bailie Higgins, convener of the Committee, suggested they should ask the manager to put a statement, which he had prepared, into the hands of the Town Clerk so that it could be circulated among the members before to-day's meeting. It appeared to him that the citizens were due to give some thanks to the Committee that had gone into the matter, and suggestions from outside bodies that the work should now be completed by gentlemen who had never shown any direct interest in Corporation affairs was absolutely unfair.

Hendon.—REVISION OF CHARGES.—The Hendon Electric Supply Co., Ltd., has introduced the following revised scale of electricity charges:—Lighting: Reduced from 4d. to 3½d. per kWh. Electricity used for purposes other than lighting: For domestic purposes, all energy consumed in excess of 120 kWh per quarter, from 1d. to ½d. per kWh; for industrial purposes to small consumers, from 1½d. to 1½d. per kWh, with an alternative tariff of a fixed charge of 10s. per quarter per b.h.p. installed, plus ½d. per kWh. The following alternative special tariffs have been introduced:—Domestic tariff for all purposes: A fixed quarterly charge, plus ½d. per kWh for electricity con-

sumed. Lighting for business purposes: Winter quarters, a charge of 1s. per quarter for each 15 watts of maximum demand, plus 1¾d. per kWh; summer quarters, a charge of 1s. per quarter for each 40 watts of maximum demand, plus 1¾d. per kWh.

Irish Free State.—SHANNON SCHEME EXPENDITURE.—According to a White Paper issued by the Irish Free State Ministry for Industry and Commerce there has been, up to March 31st, 1927, the sum of £1,511,884 placed to the credit of the Shannon Power Development Fund. Of this sum £1,509,484 has been expended under the following main heads:—Advanced to contractors on bills maturing, £600,000. Civil construction: Embankments and excavations, masonry and concrete and mechanical equipment, £201,846. Power station, £140,843. Transmission lines, £396,673. General charges, £29,064.

Isle of Axholme.—ELECTRICITY SUPPLY.—The Rural District Council has decided to support the scheme of the Yorkshire Electric Power Co. to extend its supply of electricity to the island, and to oppose the scheme of the Lincolnshire Power Co., on the grounds that the former has already brought a supply to within a short distance of the district, while it would take several years to develop the proposals of the Lincolnshire Power Co.

Japan.—ELECTRICAL DEVELOPMENT.—Work on the construction of the Shikanuma power station on the Shinano River will be put in hand shortly. The plant will include six sets of 33,300 kW each.

It is reported that official permission has been granted the Nippon Denryoku K.K. to erect a power station at Tsurumi, with an initial capacity of 35,000 kW.

The Tokio Dento's scheme for the erection of a 200,000-kW steam power station at Tsurumi includes the installation of high-pressure boilers of 1,000 lb.

The Halodate Hydro-Electric Co. is to erect a steam power station with a capacity of 5,000 kW.

Killamarsh.—NEW SUPPLY COMPANY.—At a public meeting held recently, the residents decided to form an electricity company, with a capital of £6,000 in £1 shares, for the purpose of supplying electricity to houses and works in the district. Subject to terms being agreed upon, electricity will be taken from the Staveley Coal and Iron Co.

Long Eaton.—STREET LIGHTING.—The Urban District Council has accepted the estimate of the Electricity Department for public lighting at £1,551 per annum.

Malvern.—LOAN SANCTIONED.—The Electricity Commissioners have sanctioned the borrowing by the Urban District Council of £1,290 for a new feeder main.

Peterborough.—ELECTRICITY IN BULK.—The Town Council has offered a supply of electricity in bulk to the Bourne Urban District Council on terms similar to those upon which it is supplying the Spalding Council.

Plymouth.—OPPOSITION TO BILL.—The Town Council has decided to oppose in the ensuing session of Parliament the Bill to extend the limits of supply and increase the capital of the Wessex Electricity Co. in order to safeguard the Council's interests in so far as its own electricity undertaking is concerned. A large number of other corporations and local authorities in Devon and Somerset have likewise resolved to oppose the company's Bill, either by presenting petitions to Parliament against it or by co-operating with the Devon County Council in opposition. These include the Exeter, Torquay, Weymouth, Taunton, Exmouth, Newton Abbot, Barnstaple, Bideford, Tiverton and Dawlish authorities.

Portsmouth.—ELECTRICITY IN BULK.—The Corporation Electricity Committee has made arrangements for the supply of electrical energy in bulk to the Petersfield Electric Light and Power Co., Ltd., on the following terms:—If the annual payment amounts to £1,200 per annum, £6 per kVA of maximum demand per annum; next £1,200, £5 10s. per kVA of maximum demand; over £2,400, £5 per kVA. The "unit" charge will be 0.7d.

Fowey.—INQUIRY.—In connection with an application by the St. Austell and District Electricity and Power Co., which seeks sanction to erect overhead mains in Fowey, Mr. Gordon Tucker, of the Ministry of Transport, held an inquiry on February 16th. At present the majority of the company's mains within the borough are laid underground, but it desires to extend its area of supply by means of overhead lines. The application was opposed by the Town Council and by Sir Charles Hanson, of Fowey Hall, both of whom objected to the erection of overhead equipment on the ground of its alleged danger and its effect upon the amenities of the district. Mr. W. F. Stamp, engineer and manager of the company, replying to the inspector, said that underground mains would be four times as costly as overhead lines. The inspector afterwards viewed the situation, and gave the Council's representatives and the electricity company's representatives the opportunity of making mutual suggestions with a view to settling the matter, but the Council representatives could not take upon themselves the responsibility of any definite decision until the full Town Council had been consulted. The inspector therefore said he would wait until the Council meeting had been held.

Price Reductions.—LAUNCESTON.—*Electric Supply Co., Ltd.*—As from April 1st the following reductions will be made: Lighting: From 10d. to 9d. per kWh. Power: From 4½d. to 4d. per kWh. Heating: From 2½d. to 2d. per kWh.

DALKEITH.—The Town Council has decided to make the following reductions in the charges for electricity:—Lighting: from 1s. to 9d. per kWh. Power: first 100 kWh per quarter, 6d. per kWh; next 2,500 kWh, 3d.; all energy in excess of this amount, 2½d. per kWh.

Rawtenstall.—INAUGURATION OF NEW PLANT.—A new 7,500-kW turbo-generator which has been installed at the Corporation electricity works was formally inaugurated on February 15th. The new set has increased the capacity of the station to over 16,000 kW, and the total cost, including other alterations, was £26,500.

Redcar.—LOANS.—The Town Council is applying for sanction to loans of £1,800 for meters, and £2,000 for mains and services.

Rothesay.—OVERHEAD LINE.—An overhead transmission line to Kyles of Bute Hydropathic, at a cost of £2,800, has been sanctioned by the Town Council.

SUPPLY FOR TRAMWAY.—The Town Council is to arrange a meeting with the Rothesay Tramway Co., Ltd., with regard to a proposal that the Council shall supply power for the tramway.

Southend-on-Sea. — ELECTRICITY IN BULK. — The Town Council has forwarded to the Electricity Commissioners for their information a preliminary offer from the County of London Electric Supply Co., Ltd., for a supply of electricity in bulk.

Special Orders.—Application has been made to the Electricity Commissioners for Special Orders by the Yorkshire Electric Power Co., authorising it to supply electricity in parts of East and West Riding, and part of Lindsey, Lincolnshire, and the Petersfield Electric Light and Power Co., Ltd., to supply in the rural district of Petersfield and part of the rural district of Midhurst.

The Commissioners have submitted to the Minister of Transport for confirmation Special Orders made by them authorising the Oswestry Electric Lighting and Power Co., Ltd., to supply electricity in part of the rural district of Oswestry; the Electrical Distribution of Yorkshire, Ltd., to supply in part of the rural district of Skipton; and the Chesham Electric Light and Power Co., Ltd., to supply electricity in parts of the rural districts of Amersham, Berkhampstead, Hemel Hempstead and Watford.

Sunderland.—NEW BOILER PLANT.—The Corporation has decided to install two additional boilers, with accessories, at the Hylton Road generating station.

"ALL-ELECTRIC" HOUSES.—The Corporation has also decided to equip 14 houses on its Newcastle Road housing estate as "all-electric" houses as an experiment. The tariff will be 3s. 6d. per week plus ½d. per kWh consumed. Based on a consumption of 3,000 kWh, it is estimated that the annual cost per house will be £15 7s., which, it is claimed, is £1 11s. 2d. less than the cost of gas.

Swansea.—LOAN.—The Corporation Electricity Committee is applying for sanction to a loan of £20,290 in connection with the proposed supply of power to the Mumbles Railway.

Torquay. — LOANS SANCTIONED. — The Town Council has received sanction to the following loans: £2,500 for additional rectifying plant; £18,544 for a ring main from Newton Abbot to Paignton; £394 for land and sub-station; £2,460 for sub-station equipment; £939 for mains for supplying electricity to Ipplepen; and £100 for sub-station equipment in connection with that supply.

Tunbridge Wells.—ELECTRICITY SUPPLY.—At a recent meeting of the Corporation, the Electricity Committee recommended that the following be provided for: Mains, £36,655; sub-stations and pillars, £2,805. Following criticism, the Corporation referred the matter back to the Committee.

United States. — ELECTRICAL DEVELOPMENT. — The Great Western Power Company of California has announced the acquisition of 35 acres of land in San Francisco as a site for a new steam plant. The initial capacity of this plant will be 35,000 kW, and it will be designed to burn oil as fuel. The plant will be equipped with 450-lb.-pressure boilers, and will deliver energy at 60 cycles, 11,000 V. The *Electrical World* states that it will double the company's present reserve steam supply for the San Francisco Bay region and will provide emergency service for the Great Western's extensive hydro-electric supply in this area. Work is to start at once, with completion expected next year. McClellan & Junkersfeld, New York, have been engaged to design and supervise the construction of this station, which will cost approximately $4,000,000. The Los Angeles Gas and Electric Corporation has begun the installation of a second generating unit of 35,000-kW rating. The installation of this unit will double the present capacity of the Seal Beach plant, which will ultimately reach 210,000 kW. Three new 2,500-h.p. boilers and 45,000 sq. ft. in condensers, together with the necessary pumps and switching apparatus, will be installed with the new generator, which is expected to be ready to operate about August 1st. When it is in operation the total capacity of the two steam plants of the Los Angeles Gas and Electric Corporation will be about 150,000 kW.

Tramway and Railway Notes.

Bradford. — TRAMCAR IMPROVEMENTS. — The Corporation Tramways Committee, following the fitting of 12 tramcars with upholstered seats, both in the lower and upper saloons, has decided similarly to furnish 17 more cars immediately, and gradually to apply the new seating to all cars as opportunity offers.

TRACK RENEWALS.—The Committee has considered a report of the city engineer on track reconstruction work during the current year, and has recommended that renewal of track be authorised as follows:—Cheapside and Forster Square, from Market Street to School Street, £6,143; Sunbridge Road, from Tyrrel Street to Godwin Street, £3,911; and Wakefield Road, from Elsworth Street to Rooley Lane, £24,348; total, £34,402.

Continental.—GERMANY.—The Town Council of Wiesbaden has decided to abandon the tramway service and substitute motor-'bus services for the convenience of the townspeople and visitors. This decision was made at a private meeting, when the question of renewing the concession held by the lessees was discussed. This concession expires about twelve months hence, and the Town Council decided not to grant a renewal. All the tramways in Wiesbaden, except two, which are not included in this particular concession, will therefore be abolished. The two exceptions are the lines to Mainz and from Dotzheim (where British troops are stationed) to Bierstadt.—*Reuter* (Wiesbaden).

The number of passengers carried on the Berlin tramcars, motor-omnibuses, tubes, and local railways was 1,597,000,000 in the past year, an increase of 9 per cent. as compared with 1926. The tramways carried more than half the total.

The length of the network of the Reich railways is 32,860 miles, of which 686 miles of long-distance lines were electrically operated at the end of 1927, and 69 miles of city and suburban lines. About one half of the total length of the electrified lines is situated in Bavaria, and one quarter is represented by mountainous lines in Silesia. At present 177 miles is being converted to electric traction, including 97 miles of the Berlin city railway.

ITALY.—Work has been completed on the electrification of the section of the railway between Foggia and Benevento, and an electric-train service is now in operation between Naples and Foggia.

FRANCE.—The Strasburg Chamber of Commerce has recently adopted a resolution urging the French Government to proceed with the electrification of the railways in Alsace.

CZECHO-SLOVAKIA.—Although the electrification of the main-line railways in Czecho-Slovakia was decided upon in 1924, a start is only now about to be made on the work of electrifying the local lines in the Prague district. Power will be drawn from generating stations in the North Bohemia coal-mining district, and will be converted for traction purposes from a.c. 50 cycles to 1,500 V d.c. Orders for eighteen electric locomotives for the local lines have already been placed with home firms. Plans are well in hand for the electrification of the main lines between Prague and Pilsen, Prague and Böhm, Trubau and the local railway between Reichenberg and Tannwald.

East Ham.—TRACK RENEWALS.—The borough engineer is to prepare estimates for the reconstruction of the tramway track and roadway in Plashet Grove.

Glasgow.—EXTENSION SCHEME DEFERRED.—The proposal of the Corporation Tramways Committee to install new plant at Pinkston power station, at an estimated cost of £237,000, came before the Corporation on February 16th and consideration was deferred for a month.

Lancashire.—TRANSPORT CONFERENCE.—From a conference held between Accrington, Rawtenstall, and Haslingden Corporations regarding the Accrington Parliamentary Bill, it is clear that the tramway service between Accrington and Rawtenstall will eventually be replaced by 'buses, for Haslingden has decided not to renew its existing tramway track when it is worn out, and Rawtenstall Corporation has suggested through running of express 'buses over the whole route as early as possible.

London and N.E.R. Electrification.—According to the *Evening News*, the London and North-Eastern Railway Co. is considering the electrification of the whole of the old Great Eastern suburban service from Liverpool Street. The lines which it is proposed to electrify are as follows:—To Gidea Park, 13¼ miles; to Epping, 16 miles; to Chingford, 10¼ miles; to Enfield, 10¾ miles. The plan, at present, is to use the overhead wire system, which the Southern Railway is slowly replacing with the third-rail system. In the early stages of the electric service, electric locomotives, similar to those in use with the main-line trains on the Metropolitan Railway, will be used. New complete trains, built to replace existing rolling stock, will be fitted with motor cabins at each end. When the conversion from steam is complete, the number of trains to be run will be approximately 40 per cent. greater than at present.

Manchester.—LOAN SANCTIONED.—The Corporation Tramways Committee has obtained sanction to borrow £135,500 for the reconstruction of the Middleton tramways.

Sunderland.—SCHEME REFERRED BACK.—The Town Council has referred back for three months the Tramways Committee's proposals to extend the Durham Road tramway by 1,234 yards, at an estimated cost of £19,326, and to extend the Sea Lane route to Whitburn (1,988 yards), at an estimated cost of £28,068. Opposition came chiefly from members who favoured 'buses instead of tramcars.

Telegraph and Telephone Notes.

Argentina.—NEW TELEPHONE CABLE.—La Compagnia Union Telefonica has recently applied for powers to lay a telephone cable between Buenos Aires and Rosario.

Bouvet Island.—NEW WIRELESS STATION.—The *Daily Telegraph* reports that Lars Christensen, who sent out the Norwegian expedition which occupied Bouvet Island in the South Atlantic, has taken steps to erect a wireless meteorological station on the island. If conditions permit, the station will work all the year round, and will thereby be able to give vital weather forecasts to South Africa, South America, and all navigation in that part of the Antarctic. Lars Christensen will cover all the cost of erection and the running of the station.

Canada.—TELEPHONE DEVELOPMENT.—In only one country in the world is there a higher number of telephones per 100 of population than in Canada, and in total instruments in use Canada ranks fourth. The United States has an average of 14.8 per 100 population, compared with 12.79 in Canada. The Dominion Bureau of Statistics report on telephones in Canada in 1926 states that the number of telephones in Canada has increased from 548,421 in 1916 to 1,201,008 in 1926, or by 119 per cent. during ten years. Property and equipment shows an even greater increase amounting to $227,155,700 in 1926, as against $88,520,020 in 1916, an increase of 156 per cent. British Columbia ranks first in density with 18.8 telephones per 100 population, followed by Ontario, 16.9; Saskatchewan, 12.5; Alberta, 11.7; Manitoba, 11.1; Quebec, 9.4; Nova Scotia, 7.45; New Brunswick, 7.42; and Prince Edward Island, 5.3.

"WIRED WIRELESS."—"Wired wireless," a system of communication which has hitherto been regarded as mainly applicable to short-distance messages, is to be tried in Canada between Vancouver and Montreal. According to the *Daily News and Westminster Gazette*, the two cities are to be linked up by this new system, which is already proving a success between Montreal and Winnipeg, over a distance of 1,200 miles. The wireless impulses by this method are superimposed on the ordinary telegraphic impulses, and can be sent over the wires simultaneously with telegraphic messages. This will make it possible to transmit 84 messages at one time, including the human voice, in both directions.

France.—TELEPHONE DEVELOPMENT.—According to a report recently issued by the French Post and Telegraph authorities, there were 148,890 telephone subscribers in Paris at the end of November last.

Latvia.—WIRELESS COASTAL STATION.—A wireless coastal station is to be erected on the island of Runö in the Gulf of Riga. The new station will be useful in supplying information concerning ice conditions in the district.

Radio-Telephony to the Arctic.—UNITED STATES EXPERIMENT.—According to the New York correspondent of *The Times*, Professor William H. Hobbs, of Michigan University, states that a conversation was recently maintained by wireless telephone between a private house in Manchester, Connecticut, and the camp of the Michigan University Meteorological Expedition in South-West Greenland. This is believed to be the first time that the "radiophone" has extended as far as the Arctic Circle. The expedition is making investigations on the subject of gales and storms originating on the Greenland ice cap. Professor Hobbs is directing operations from Michigan by means of short-wave wireless. The camp is situated on Mount Evans, about a hundred miles inland and half a degree north of the Arctic Circle. Conversation was made possible by the use of the wireless plant designed by Mr. Reinartz, the wireless expert, who took part in the talk from the house in Manchester, to which a reply came in code from the wireless operator at the Mount Evans Camp, stating that, although some words were indistinct, every speaker had been heard.

Russia.—LONG-DISTANCE TELEPHONY.—A long-distance telephone line equipped with Siemens ampliers has recently been put in operation between Leningrad, Moscow, and Tiflis.

The Telegraph Service.—SUGGESTIONS FOR ECONOMY.—The Parliamentary correspondent of the *Daily Telegraph* states that it is understood that Sir Hardman Lever's Committee, which was appointed to inquire into the telegraph service, has

now presented its report to the Postmaster-General, and that the document proposes various administrative changes. It is not pretended, however, that even if these were carried out, the telegraph service will become profitable. The obligation on the Post Office to maintain telegraph centres in rural areas involves heavy financial loss, but if it were proposed to close these offices the protests both from Parliament and the districts affected would be overwhelming. It is recognised that inevitably as the telephone gains in popularity and efficiency, the demand for the telegraph service will contract. The Committee, it is understood, will propose a number of changes in the direction of economy.

Transatlantic Telephony.—U.S.A.-SWEDEN.—On February 20th telephone communication was established between Sweden and the United States and Cuba. The first conversation exchanged was between the Crown Prince Regent, the Swedish Minister in Washington, and Mr. Kellogg, the United States Secretary of State. The United States Minister in Stockholm then spoke with Mr. Kellogg, and afterwards the two chiefs of the telegraph services conversed together.

Trans-Pacific Cable.—NO AGREEMENT WITH JAPAN.—President Newcomb Carlton has recently announced in San Francisco, Cal., that the plan of the Western Union Telegraph Co. to lay a high-speed cable between Seattle, Washington, and Japan has been abandoned. The reason for this, according to the *Telegraph and Telephone Age*, is the inability of the telegraph company to meet the requirements of the Japanese Government. The Western Union now has under consideration plans for laying a cable across the Pacific *via* the southern route, starting at San Francisco, touching the Hawaiian Islands and stretching to the Philippine Islands, which would be the main terminal in the Far East, instead of Hakodate Island, a Japanese possession.

Radio Notes.

Germany.—INTERFERENCE WITH WIRELESS SETS.—Owners of wireless sets have formed a union for the purpose of protecting their rights, and have affiliated themselves to the National Society and Rhenish-Westphalian Wireless Dealers' Federation. The first move of the new Union is to pass a resolution, which has been forwarded to the Government Commissioner for Wireless, the Postmaster General for the Dusseldorf area, the Oberburgermeister of Essen, and the Chief of the Essen Tramway Administration, to the effect that owners of wireless sets will decline to pay the Government licence fees unless and until the interference with reception caused by the overhead wires of the tramways is abolished. Many experiments have been made, and are still being continued, to overcome this trouble.—*Reuter* (Essen).

India.—BROADCASTING.—Following upon the unsatisfactory financial position of broadcasting in India, attributed largely to the extent to which "piracy" is practised, rumours have been current recently regarding the future of broadcasting in India. It is now understood, however, that the Indian Broadcasting Company has definitely decided to continue its present services both in Bombay and Calcutta, but the hours of broadcasting will be slightly reduced as from March 1st.—*Reuter* (Bombay).

Licences.—The *Daily Telegraph* reports that in January there was an increase of 34,405 in the number of receiving licences in force, excluding 2,807 issued free to blind listeners. This is the biggest increase in one month since January of last year, and brought the total number of licences to 2,418,131, plus 14,255 granted to blind people. In the last two months the total increase has been 62,000, whereas the average advance per month in 1927 was 17,122. The recent increases are attributed largely to 5GB, the new Daventry experimental station, which is believed to be gaining a growing circle of listeners.

Norway.—PROPOSED HIGH-POWER STATION.—The Oslo correspondent of *World Radio* reports that the directors of the Broadcasting Company have now definitely approached the Norwegian Government (Board of Trade Department) with a detailed and exhaustive statement of the state of broadcasting in Norway, and the methods by which pressing difficulties might be met. The question of the establishment of one large and powerful station, they say, is vital for the future welfare of broadcasting in Norway. The financial aspect of the situation is dealt with in the report to the Board of Trade. It is suggested that the Broadcasting Company should be granted a renewal of the concession, and that the State should take over the station at its current value. The establishment of a large station at Oslo would leave several of the company's present stations available for use in other parts of the country. It is hoped that the matter will be decided by the end of February, so that the planning of the proposed powerful new station may be begun without delay, with a view to its being ready for broadcasting some time next autumn.

Contract Information.

When "Contracts Open" are advertised in our "Official Notice" pages, the date of the ELECTRICAL REVIEW containing the advertisement is given in parentheses below.

Contracts Open.

Ashford.—March 12th. Electricity Department. One 600-kW alternator, suitable for direct-coupling to a Diesel engine. (See this issue.)

Australia.—MELBOURNE.—March 14th. Victorian Government Railways. One 2-ton electric overhead travelling crane. (A.X. 5863.)*

Postmaster-General's Department. March 20th. Loading coil pots complete with coils. (B.X. 4221.)*

April 10th. Induction coils and registers. (B.X. 4219.)*

April 17th. Telephone transformers. (B.X. 4220.)* Telephone cord weights. (B.X. 4214.)* Telephone switches. (B.X. 4223.)* Accumulator batteries, plates and separators. (B.X. 4193.)*

April 24th. Telephone transmitters and associated parts. (B.X. 4222.)* Cordless switchboards. (B.X. 4218.)*

BRISBANE.—May 16th. City Electric Light Co., Ltd. Supply of 33,000-V underground cable and submarine cable. (Spec. 148.) Mr. J. S. Just, engineer and manager, Boundary Street, Brisbane.

Bakewell.—March 24th. Board of Guardians. Electric lighting wiring and accessories at Poor Law Institution. Specification and quantities (deposit £1 1s.) from Mr. A. Hawes, clerk to the Guardians, Union Offices, Bakewell.

Barrow-in-Furness.—March 8th. Electricity Department. Six or 12 months' supply of oils, engine room stores, &c., electrical stores, meters, cables, &c., and steam coal (See this issue.)

Bedford.—March 2nd. Electricity Department. Cables, lamps, &c., for 12 months. (February 17th.)

Blackpool.—March 19th. Electricity Department. E.h.p. feeders, l.p. feeders, distributors, disconnecting pillars, boxes and services. (See this issue.)

Bristol.—March 5th. Port of Bristol Authority. Three l.p. switchboards for the Royal Edward Dock extension. (February 17th.)

Colchester.—Electricity Department. L.p. cables. (See this issue.)

Dartford.—March 6th. Electricity Department. 4,456 yd. e.h.p. cable and extension of e.h.p. switchgear. (February 17th.)

Dundee.—March 15th. Electricity Department. Steam, feed, blow-off water and drain piping. (See this issue.)

Edinburgh.—March 19th. Electricity Supply Department. Twelve months' supply of cables, conduits, pavement and road box frames and covers, house service fuse boxes, fuseboards and meters. (February 17th.)

Glasgow.—February 25th. Corporation Gas Department. Seventeen 440-V replacement motors for the Dawsholm gas works. Specifications, &c., from General Manager, 30, John Street.

Ilford.—February 27th. Electricity Department. Two 1,500-kW auto-synchronous motor generators. (February 10th.)

Kettering.—February 29th. Electricity Department. H. and l.p. cables and transformers. (February 17th.)

London.—CENTRAL ELECTRICITY BOARD.—March 6th. 132-kV switchgear for outdoor transforming stations. (January 20th.)

METROPOLITAN ASYLUMS BOARD.—March 21st. General engineering work, including steam plant, steam and condense mains, h.w.s. mains and apparatus, motor drives, &c.; installation of four new Lancashire boilers; installation of new fuel economiser; brickwork settings for four boilers and economiser; installation of electric lighting, power and telephones at Caterham Mental Hospital. (See this issue.)

ST. PANCRAS.—March 3rd. Electricity Department. Two 1,000-kW and one 1,500-kW motor convertors. (February 10th.)

STEPNEY.—March 1st. Board of Guardians. Six months' supply of electrical fittings. Mr. S. McClelland, clerk to Guardians, Bancroft Road, Mile End, E.1.

Maltby.—March 13th. West Riding Education Committee. Electric lighting installation, Special Subjects Centre, Maltby Hill Council school. Specifications from Education Department, County Hall, Wakefield.

Manchester.—February 28th. Electricity Committee. Five motor (or rotary) convertors. (February 10th.)
Starting switches for d.c. motors and star-delta switch starters and industrial electric motors. (See this issue.)

New Zealand.—WELLINGTON.—March 21st. Post and Telegraph Department. Automatic telephone receivers. (B.X. 4143.)*

Oldham.—March 12th. Board of Guardians. Electric lamps and fittings for the Union Institution, Rochdale Road. Form of tender from Mr. F. W. Fletcher, clerk to the Guardians, Union Offices.

Portsmouth.—March 5th. Tramways Committee. Twelve months' supply of materials, including insulating materials, lamps, overhead line material, &c. (February 17th.)

Rhondda.—March 31st. Electricity Department. Twelve months' supply of meters, cables, joint boxes, compound, cut-outs, &c. (See this issue.)

Roxburgh.—March 7th. Education Authority. Electrical work at new offices, Newtown St. Boswells. Schedules, &c., from Executive Officer, Education Office, Newtown St. Boswells.

Rugby.—March 5th. Electricity Department. One 2,000-kVA transformer, with switchgear. (February 10th.)

Seaford.—February 29th. Electricity Department. Replating storage battery. (See this issue.)

Skegness.—February 29th. Urban District Council. Electricity plant. (See this issue.)

South Africa.—JOHANNESBURG.—April 5th. South African Railways and Harbours. Two electric goods lifts. (A.X. 5873.)*
March 1st. Telegraph material. (B.X. 4202.)*
May 3rd. Postmaster-General's Department. Manual telephone exchange for Hillbrow, Johannesburg.
CAPE TOWN.—March 7th. Electricity Department. Electricity meters. (B.X. 4189.)* Insulated wire. (B.X. 4191.)*
PRETORIA.—April 5th. Town Council. One 7,500-kW turbo-generator with alternative of one 6,000-kW ditto.

Sunderland.—March 5th. Electricity Department. Two water-tube boilers with superheaters, mechanical stokers, economisers, chimneys, feed pumps, &c. General Manager, Electricity Offices, Dunning Street.

Tipperary. — February 29th. Roscrea Waterworks. Electric pumps, &c. Specifications (deposit £10 10s.) from Tipperary (North Riding) County Board of Health and Public Assistance, County Home, Thurles.

Uruguay.—MONTEVIDEO.—March 19th. State Electricity Works. Equipment for one main transformer station, five sub-transformer stations, two connection posts, and one inspection post, with accessories and spares. (B.X. 4173.)*

Warrington. — March 12th. Electricity Department. Motors and transformers. (See this issue.)

West Bromwich.—March 14th. Board of Guardians. Electric lighting installation at the medical officer's, &c., quarters at Hallam Hospital. Specifications (£2 2s.) from Mr. A. H. Ward, clerk, 22, Lombard Street, West Bromwich.

*Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed.

Bradford.—Electricity Committee. Recommended:—
Automatic d.c. switchboard at Dudley Hill sub-station.—Bertram Thomas.

Dublin.—Borough Commissioners.
Oil-immersed h.p. circuit breakers.—Sprecher & Schuh.
L.p. ditto.—J. G. Statter & Co.
—*Irish Builder and Engineer.*

Durham.—County Education Committee. Accepted:—
Electric lighting school extension, Haverton Hill.—T. A. Taylor.

Eastbourne.—Motor-'bus Committee. Accepted:—
Modernising lighting equipment of old motor-'buses (£300).—C. A. Vandervell & Co., Ltd.

Glasgow.—Cleansing Committee. Recommended:—
Overhead charging feeder system at Govan refuse works (£663).—James Kilpatrick & Son.

Government Contracts.—The following contracts were placed by various Government departments during January:—

ADMIRALTY CONTRACT AND PURCHASE DEPARTMENT.

Battery components.—Tudor Accumulator Co., Ltd.
Regulating boards.—Whipp & Bourne, Ltd.
Electric boilers.—Benham & Sons, Ltd.
Carbon brushes.—Morgan Crucible Co., Ltd.
Electric cables.—Anchor Cable Co., Ltd.; British Insulated Cables, Ltd.; Edison Swan Cables, Ltd.; W. T. Henley's Telegraph Works Co., Ltd.; Hooper's Telegraph and I.R. Works, Ltd.; General Electric Co., Ltd.; W. T. Glover & Co., Ltd.; Johnson & Phillips, Ltd.; Siemens Bros. & Co., Ltd.
Cells.—Fuller Accumulator Co. (1926), Ltd.; London Battery & Cable Co., Ltd.; D.P. Battery Co., Ltd.
Dry cells.—General Electric Co., Ltd.
Petrol-electric crane.—Ransomes & Rapier, Ltd.
Oil-driven generating sets.—English Electric Co., Ltd.
Motor generator.—Crompton-Parkinson, Ltd.
Electric heating elements.—Credenda Conduits Co., Ltd.
Electric lighting installation.—G. E. Taylor & Co.
Electric lamp fittings.—Engineering & Lighting Equipment Co., Ltd.; Rainsford & Lynes; McGeoch & Co., Ltd.; General Electric Co., Ltd.; Gabriel & Co.
Lampholders.—General Electric Co., Ltd.; McGeoch and Co., Ltd.; Rainsford & Lynes, Ltd.; Edison Swan Electric Co., Ltd.; J. H. Tucker & Co., Ltd.
Electric lamps.—General Electric Co., Ltd.
Bridge meggers.—Evershed & Vignoles, Ltd.
Electrically-driven pumps.—Stothert & Pitt, Ltd., and Drysdale & Co., Ltd.
Rotary switches.—Tok Switches, Ltd.
Copper wire.—Concordia Electric Wire Co., Ltd.; Kent Bros. Electrical Wire Co.; E. H. Phillips, Ltd.; Ward and Goldstone, Ltd.; Scott Insulated Wire Co., Ltd. Connollys (Blackley), Ltd.

POST OFFICE.

Manufacture, supply, drawing in and jointing cable.—Rodney-Beckenham Junction. Mechanical tandem, Kingston Junction.—Standard Telephones & Cables, Ltd. Maidenhead-Henley.—Johnson & Phillips, Ltd. G.P.O. (South), Streatham-Mitcham Lane Junction.—Callender's Cable & Construction Co., Ltd.
Motor convertor, Mount Pleasant Sub-station.—English Electric Co., Ltd.
Telephone exchange equipment.—Colchester: General Electric Co., Ltd. Sub-contractors: Crompton-Parkinson, Ltd., for machines; D.P. Battery Co., Ltd., for batteries. Armstrong, Siddeley Motors, Ltd. (Coventry and Whitley): General Electric Co., Ltd. Sub-contractors: W. Jones & Co., for ringing machines. Speedwell, Willesden, Byfleet (Surrey), and Canford Cliffs (Poole): General Electric Co., Ltd. New Cross, Ealing, Wallasey, and Port Talbot (Glam.): Standard Telephones & Cables, Ltd. National: Automatic Telephone Manufacturing Co., Ltd. Sub-contractors: Crompton-Parkinson, Ltd., for charging machines; Newton Bros. (Derby), Ltd., for ringing machines; Alton Battery Co., Ltd., for batteries. Tandem, Torquay, Cheltenham, Paisley, Paignton, Prospect, and Worthing: Automatic Telephone Manufacturing Co., Ltd. Mitcham: Siemens Bros. & Co., Ltd. Sub-contractors: English Electric Co., Ltd., for charging machines; Crompton-Parkinson, Ltd., for ringing machines; Tudor Accumulator Co., Ltd., for batteries. Camberley and Woolwich: Siemens Bros. & Co., Ltd. Old Swan (Liverpool): Ericsson Telephones, Ltd.
Telephone repeater station equipment (2- and 4-wire) (Marks Tey).—Standard Telephones & Cables, Ltd.
Repeater equipment extension (Aldeburgh).—Standard Telephones & Cables, Ltd.
Telegraph apparatus.—Creed & Co., Ltd.
Telephone apparatus.—Automatic Telephone Manufacturing Co., Ltd.; International Electric Co., Ltd.; Siemens Bros. & Co., Ltd.; Standard Telephones and Cables, Ltd.; Sterling Telephone & Electric Co., Ltd.
Protective apparatus.—Phœnix Telephone & Electric Works, Ltd.
Wireless apparatus.—Standard Telephones & Cables, Ltd.
Battery stores.—Ericsson Telephones, Ltd.; Fuller Accumulator Co. (1926), Ltd.; General Electric Co., Ltd.; Hart Accumulator Co., Ltd.; Siemens Bros. & Co., Ltd.
Terminal blocks.—Solidite & Synthetic Mouldings, Ltd.
Cable (various).—British Insulated Cables, Ltd.; Callenders Cable & Construction Co., Ltd.; Enfield Cable Works, Ltd.; General Electric Co., Ltd.; W. T. Glover and Co., Ltd.; W. T. Henley's Telegraph Works Co., Ltd.; Johnson & Phillips, Ltd.; Pirelli General Cables, Ltd.; Siemens Bros. & Co., Ltd.; Standard Telephones and Cables, Ltd.; Union Cable Co., Ltd.
Vacuum cleaners.—Electrolux, Ltd.
Electric clocks.—Gent & Co., Ltd.
Loading coils.—General Electric Co., Ltd.
Telephone cords.—British Insulated Cables, Ltd.; London Electric Wire Co. & Smiths, Ltd.
Dynamotors.—W. Jones & Co.; M. W. Woods.
Ebonite.—India Rubber, Gutta Percha & Telegraph Works Co., Ltd.
Telegraphic ironwork.—Bullers, Ltd.; J. Hill & Sons.
Electric lamps.—Edison Swan Electric Co., Ltd.
Hand lamps (electric).—Revo Electric Co., Ltd.
Insulating tape.—W. T. Henley's Telegraph Works Co., Ltd.

Wallboards.—Venesta, Ltd.
Wire.—Whitecross Co., Ltd.
Cadmium Copper wire.—F. Bolton & Son, Ltd.; R. Johnson & Nephew, Ltd.; F. Smith & Co., incorporated in the London Electric Wire Co. & Smiths, Ltd.
Annealed copper wire.—J. Wilkes, Son & Mapplebeck, Ltd.

WAR OFFICE.

Inert cells.—Siemens Bros. & Co., Ltd.
Electric drills.—Vidal Engineering Co.
Electric fans.—Revo Electric Co., Ltd.

AIR MINISTRY.

Motor generators.—W. Mackie & Co., Ltd.
Magneto spares.—British Thomson-Houston Co., Ltd.
Motor alternator set.—Electric Construction Co., Ltd.
"Reid" type reaction apparatus.—Reid Manufacturing and Construction Co.

CROWN AGENTS FOR THE COLONIES.

Cables.—British Insulated Cables, Ltd.; Callender's Cable and Construction Co., Ltd.; General Electric Co., Ltd.; W. T. Glover & Co., Ltd.; Standard Telephones and Cables, Ltd.
Distribution materials.—W. T. Henley's Telegraph Works Co., Ltd.
Electric fans.—Crompton-Parkinson, Ltd.
Electric light fittings.—J. Stone & Co., Ltd.
Lifts.—Marryatt & Scott, Ltd.; Waygood-Otis, Ltd.
Telegraph line materials.—Bullers, Ltd.; Siemens Bros. and Co., Ltd.
Telephone materials.—Ericsson Telephones, Ltd.; Peel-Conner Telephone Works, Ltd.
Wire.—Shropshire Iron Co., Ltd.; F. Smith & Co., Ltd.; Whitecross Co., Ltd.
Wireless apparatus.—Radio Communication Co., Ltd.

Irish Free State.—DUBLIN.—Post and Telegraph Department. With reference to our Note on page 293 of last week's issue, we are informed that this should read 95 miles telephone cable (approx. £1,000).—J. Lake (Société Industrielle des Téléphones).

Lichfield.—Town Council. Accepted:—
Wiring houses for electric light.—Electrical Contracting Co. (Tamworth), Ltd.
Electric lamp standards at £4 19s. 3d. each, net.—Revo Electric Co., Ltd.

London. — ISLINGTON. — Electricity Committee. Recommended:—
Repairing concrete coal bunkers at power station (approx. £600).—Cement Gun Co., Ltd.

LONDON COUNTY COUNCIL.—Accepted:—
Track rails and bolts:—

Anglo-Belgian Steel Corporation	£30,747
Dorman, Long & Co., Ltd. (Accepted.) ...	**38,653**
Cargo Fleet Iron Co., Ltd.	39,440
Bolckow, Vaughan & Co., Ltd.	39,742

ADMIRALTY:—
570 24-volt h.t. batteries, 3,000 separate cells.—Edison Swan Electric Co., Ltd.

METROPOLITAN WATER BOARD. Accepted:—
Electrically-driven automatic coal crusher at Kempton Park (£128).—Sturtevant Engineering Co., Ltd.

Manchester.—Education Committee. Accepted:—
Electric lighting at schools—Newton Heath Technical School.—Sudlow & Co. Barlow Moor Road School.—G. Brader.

Tramways Committee. Accepted:—
Three Collins automatic point controllers.—Forest City Electric Co., Ltd.
Lighting dynamos for motor-'buses.—Northern Auto-Electric Services, Ltd.

Portsmouth.—Electricity Committee. Accepted:—
Circulating pump (£740).—G. & J. Weir, Ltd.
Renewal of motor generator:—

General Electric Co., Ltd. (Accepted.) ...	**£691**
English Electric Co., Ltd.	800
Bruce Peebles & Co., Ltd.	741
Ditto (alternative)	829
Brush Electrical Engineering Co., Ltd. ...	858
Metropolitan-Vickers Electrical Co., Ltd. ...	905
Mather & Platt, Ltd.	944

5,500 yd. h.p. cable:—

Johnson & Phillips, Ltd. (Accepted.) ...	**£4,427**
British Insulated Cables, Ltd.	4,505
Pirelli-General Cable Works, Ltd.	4,510
W. T. Glover & Co., Ltd.	4,530
Callender's Cable and Construction Co., Ltd.	4,538
W. T. Henley's Telegraph Works Co., Ltd. ...	4,587
Standard Telephones and Cables, Ltd.	4,565
Siemens Bros. & Co., Ltd.	4,593

7,950 yd. of l.p. cable (£5,043).—Johnson & Phillips, Ltd.

Rothesay.—Town Council. Accepted:—
Overhead transmission line to Kyles Bute Hydropathic Establishment:—
Overhead line.—R. M. Russell.
Switchboard.—Metropolitan-Vickers Electrical Co., Ltd.
Underground cable.—British Insulated Cables, Ltd.

Rotherham.—Electricity Committee. Accepted:—
Cable (£192).—Callender's Cable & Construction Co., Ltd.

Stoke-on-Trent.—Health Committee. Accepted:—
Electric lighting installation, nurses' home, Infectious Diseases Hospital (£184).—Painter & Madew.

Tilbury.—Urban Council. Accepted:—
Installing electric light at 250 additional houses.—Electrical Installations, Ltd.

Forthcoming Events.

British Industries Fair, 1928.—White City, London, W., and Castle Bromwich, Birmingham. February 20th to March 2nd.

Physical Society.—Friday, February 24th. Imperial College of Science, South Kensington, S.W. 5 p.m. Ordinary meeting.

Birmingham Electric Club.—Friday, February 24th. Grand Hotel. 7 p.m. "A Review of Domestic Load Matters." Mr. W. J. Forster.

North-East Coast Institution of Engineers and Shipbuilders.—Friday, February 24th. Mining Institute, Newcastle-on-Tyne. 6 p.m. "The Mitchell Crankless Engine." Messrs. G. U. L. Sartoris and K. Watson.

Junior Institution of Engineers.—Friday, February 24th. 39, Victoria Street, S.W. 7.30 p.m. "The Applications of Electro-Chemical Deposits of Metals to Engineering." Mr. C. H. Faris.
Saturday, February 25th. Portman Rooms. 7.15 p.m. Annual dance.
Friday, March 2nd. 39, Victoria Street, S.W. "Some Notes on a Recent Visit to the United States of America." Mr. A. Abbey.

Institution of Engineering Inspection.—Friday, February 24th. Royal Society of Arts, John Street, Adelphi, W.C. 7.30 p.m. "The Inspection of Public Service Vehicles." Major R. V. C. Brook.

Nottingham Society of Engineers.—Monday, February 27th. Victoria Station Hotel. 7.30 p.m. "The Analysis of the Dual-Combustion Cycle." Messrs. H. P. Baker and H. J. Webb.

Institution of Electrical Engineers.—INFORMAL MEETING.—Monday, February 27th. Institution, London, W.C. 7 p.m. "132,000-V Cables." Mr. L. Emanueli.
Thursday, March 1st. Institution, London, W.C. 6 p.m. Faraday Lecture, "Electricity in the Service of Man." Dr. S. Z. de Ferranti, F.R.S.
(London Students' Section).—Friday, February 24th. Institution, London, W.C. 6.15 p.m. Joint meeting with the Students' Sections of the Institutions of Civil and Mechanical Engineers. "Salesmanship and Engineering." Mr. F. C. Dain.
(Western Centre).—Friday, February 24th. Cardiff. Faraday Lecture, "Electricity in the Service of Man." Dr. S. Z. de Ferranti, F.R.S.
(North-Eastern Centre).—Monday, February 27th. Armstrong College, Newcastle-on-Tyne. 7 p.m. "Modern Electric Wiring particularly as applied to Small Houses." Mr. D. S. Munro; and "The Domestic Applications of Electricity." Messrs. A. J. Milne and R. H. Rawll.
(North-East Students' Section).—Friday, March 2nd. Armstrong College, Newcastle-on-Tyne. 7.15 p.m. "A Stroll among the Elements." Mr. C. Turnbull.
(North-Western Students' Section).—Tuesday, February 28th. Milton Hall, Manchester. 7 p.m. "The Design of Overhead Transmission Lines." Mr. P. McKenna.
(South-Midland Centre).—Wednesday, February 29th. University, Birmingham. 7 p.m. "The Transatlantic Telephone Circuit." Mr. E. H. Shaughnessey.
(East Midland Sub-Centre).—Tuesday, February 28th. The College, Loughborough. 6.45 p.m. "Some Practical Considerations in the Design of Automatic Equipments for Heavy Traction Sub-stations." Mr. H. B. Poynder.
(Tees-side Sub-Centre).—Tuesday, February 28th. Annual dinner.

Royal Society of Arts.—Monday, February 27th. John Street, Adelphi, W.C. 8 p.m. "Fatigue Phenomena, with special reference to Single Crystals." Dr. H. Gough. (Lecture III.)
February 29th. 8 p.m. "Industry Fifty Years Hence." Mr. A. Crawford.

Illuminating Engineering Society.—Visit to the E.L.M.A. Lighting Service Bureau. Tuesday, February 28th. 6.30 p.m.

Paisley Association of Electrical Engineers.—Tuesday, February 28th. George A. Clark Town Hall, Paisley. 7.30 p.m. "Development of Machine Design." Mr. T. White.

Finsbury Technical College Old Students' Association.—Friday, March 2nd. Engineers' Club, London, W.1. Annual dinner.

The "Electrical Review" Service Department.

INQUIRIES must be accompanied by a stamped addressed envelope.

We should be glad to learn the names and addresses of makers of the following:—

KOSMOID commercial time stamp.
PREMIER vibrators.
A special pad for etching names on lamps.
NETTLE fittings.
HECLA bowl fires.
PRESSPAHN packings for fitting under sunk switches.

We also have an inquiry for the present address of Messrs. Shell Crafts Electrical Co.

Notes.

Transatlantic Television.

On the night of February 8th a man and a woman sitting before electrical apparatus in a London (England) laboratory were seen by a group of people in a darkened basement in Hartsdale village, New York, U.S.A., who watched them turn their heads and move from side to side; the images were crude and broken, but they were images nevertheless. The demonstration was made by the Television Development Company, of London, using short-wave wireless sets for transmission, and a televisor invented by Mr. John L. Baird for reception. —*Reuter* (Hartsdale, New York).

Fatalities.

William Mathers was killed by an express train at Shortlands Station on February 15th. He was working with Thomas Knight when the pick-axe of one of the men came in contact with the "live" rail. There was a flash, and both men, startled, jumped aside, and were caught by the express. Knight received severe injuries when the express struck him and through coming in contact with the "live" rail.

John Murdoch Findlay, of Motherwell, received a fatal electrical shock on February 14th while at work in No. 4 Pit, Watson's Colliery, near Motherwell. He had been attending to the conveyors of a coal-cutting machine when, it is believed, a ragged end of the rope being used pierced the cable. Findlay, who had the end of the rope in his hands, received a shock at 250 V.

Telephone Cable Balancing.

At a meeting of the Institution of Post Office Electrical Engineers, at Preston, Mr. Thomas Woodhouse, A.M.I.E.E., spoke on "Rebalancing a Cable." The object, when rebalancing a main trunk cable, he said, was to reduce to a minimum the interference or "cross talk" between circuits carried in it. The sources to which interference could usually be traced were: the manner in which wires were laid up in forming the cable, leakage of current, resistance unbalance, capacity unbalance, and the introduction of loading coils and repeaters into the circuits. In practice, efforts were made primarily to obtain the most satisfactory conditions in each complete loading coil section of cable. The length of those sections was regulated mainly by the amount of inductance which would be added to the circuits by loading, the class of traffic being the deciding factor.

Institute of Wireless Technology.

A meeting of the Institute will take place at the Engineers' Club, Coventry Street, W., on Thursday, March 1st, at 7 p.m., when Mr. W. H. B. de M. Leathes will continue his talk on "Experiments with Multi-Feed Aerials." Those interested in the activities of the Institute should communicate with the secretary at 71, Kingsway, London, W.C.2.

"Boundary Lubrication."

In a paper, "Some Contributions to the Theory and Practice of Lubrication," by Mr. J. E. Southcombe, M.Sc., read before the North-East Coast Institution of Engineers and Shipbuilders recently, the newly established "boundary" theory of lubrication is dealt with. It is shown that friction is directly related to the molecular properties of the bearing surfaces and the lubricant. Solids in a clean dry state are possessed of considerable surface energy which is the cause of friction, but when minute impalpable films of certain substances are deposited on them, the surface energy is much reduced, with a corresponding diminution in friction. Lubrication must, therefore, be regarded as influenced by adsorption of the fluid at the solid interface. The mechanism by which the boundary layer is formed on the solid is discussed, and attention is drawn to the importance of the structure of this layer in lubrication. The "primary" layer is not monomolecular, but probably of considerable thickness, the liquid molecules being oriented at the solid face and losing "fluidity." "Oiliness" is now capable of definition, and this property can be conferred on mineral oils by treatment with fatty acids. The application of the theory to commercial lubrication is illustrated by the proprietary products called "Germ oils." The superior lubricating properties of "adsorbable oils" are illustrated when applied to rotational movement, reciprocating motion and gears. The "unknown boundary effects" of Reynolds are shown to play an important part in fluid film lubrication, and the disturbing action of steam and water vapour on the oil film is briefly considered from the physico-chemical standpoint.

An I.E.E. Dinner.

The annual social gathering of the North-Eastern Centre of the Institution of Electrical Engineers was held at the Station Hotel, Newcastle-on-Tyne, on February 14th. It was of a threefold character, a reception, dinner, and re-union, and was throughout most successful. The gathering, which was honoured by the presence of Mr. Archibald Page, president of the Institution, was numerously attended, and thoroughly representative. Mr. H. Paterson, the chairman of the Centre, presided, and about 130 covers were laid.

After the loyal toasts, Mr. R. W. GREGORY proposed the toast of the "Lord Mayor and Corporation of Newcastle-upon-Tyne." Referring to the smoke in the city emitted from the many coal fires, he said that it seemed that the only remedy was electricity. He spoke of the deep depression through which the district had passed; when they considered the effect of that depression on the public purse, he thought that the Corporation had reason to be proud of not having only maintained the public services, but also effected improvements in the city.

The Deputy Lord Mayor (Dr. SIMPSON), replying, thought that if they amalgamated a lot of the municipalities round about them, and so made a great northern metropolis, some of the things for which they wished would become more easy of accomplishment.

"The Institution of Electrical Engineers" was proposed by Mr. MARK FORD. He spoke of the value of electricity in the mining industry, and said that as the best seams of coal were becoming rapidly exhausted they were having to work the thinner seams; electricity played no small part in getting the best out of the latter, and enabled them to meet the competition in the trade.

Mr. PAGE replied, and spoke of the cordial relationship that existed between the Institution and the other professional bodies in the various districts. Newcastle stood unassailable in the sphere of electricity; they dare not bring electricity to Newcastle, they rather had to bow in reverence and pay a tribute to its achievements. The Government had already been rummaging round the district, and had not failed to note the standardisation and interconnection there. It was not an exaggeration to say that the example of the North-East Coast in electrical matters was the inspiration and the justification of the 1926 Act.

Mr. THOS. CARTER proposed "Our Guests," to which Sir HOLBERRY MENSFORTH responded, and the Sheriff added a quota of humorous remarks.

The toast of the chairman having been honoured, the gathering resolved itself into an informal reunion.

Local Societies.

Mr. H. Wright, B.Sc., lectured last week on "The Nature of Electricity" to the Thornhill Literary and Debating Society. His address was divided into four sections: The artificial production of electricity; Former theories of the nature of electricity; Present-day theories; and Explanation of electric phenomena by the present electron theory. He illustrated the lecture by experiments.

Faraday House Old Students' Association.

The above Association has arranged to hold a dance on March 2nd at the Victoria Rooms, Southampton Row (opposite Faraday House). An excellent dance band will be in attendance, and refreshments will be served during the evening. Arrangements are also being made for a first-class "turn." The price of a double ticket, including refreshments, is 7s. 6d. Early application for tickets should be made to the Hon. Secretary, Faraday House, O.S.A., Southampton Row, W.C.1.

The P.O. (London) Railway.

With reference to our description of the electrical equipment of the above railway in our issues of February 10th and 17th last, we are asked to state that the batteries used on the battery locomotives are of the "Kathanode" type supplied by the "D.P." Battery Co., Ltd., and also that the sub-stations feeding the railway are controlled by Taylor-Scotson regulators.

Overhead Lines Association.

The council of the above Association has in preparation a summarised report of the proceedings, including the meetings of November 2nd and 30th, January 11th, and February 8th on Wayleaves and on Regulations. The next meeting will be held on March 14th, 5.30 p.m. at the Institution of Electrical Engineers, Savoy Place, London, W.C.2, when Mr. E. S. Byng will read a paper on "Joint Use of Wood Pole Lines for Electricity Supply and Communication Systems." Subsequent meetings have been fixed for April 18th, May 16th, June 13th, and July 18th, for the same place and time.

Television for Amateurs.

The Times reports that Mr. J. L. Baird on February 20th opened the first television sales department in the world at Selfridge's. At a luncheon preceding the opening, Mr. Baird said that the new department would sell parts which would enable the amateur constructor to build his own television sets. It would, however, only allow very crude silhouettes to be transmitted. This was only a beginning, and the amateur could use this elementary televisor as a basis for building a more technical machine for receiving the television transmissions sent out on a wave-length of 45 metres.

E.A.W. Activities.

The first lecture for cooks, "The Construction and Control of an Electric Cooker," of the Electrical Association for Women was given by Miss Dorothy Vaughan at the new electric kitchen at the Association's headquarters, 46, Kensington Court, on February 13th.

A very interesting and instructive lecture was given on February 16th by Mr. W. C. Jeary, on "Bells and Batteries."

At a recent meeting of the newly formed Leeds and West Riding branch of the Electrical Association for Women, it was reported that the membership had reached over 50.

AN E.A.W. CAMPAIGN.—The Association has mainly, up to the present, been concerned with educational work amongst its own members in various parts of the country. This inaugural work has enabled the members to gain considerable general knowledge of electrical economics and methods, and as the time now seems ripe for the Association to endeavour to educate those responsible for housing schemes in the need of providing, during building, ample provision for the future use of electricity, it is proposing to organise an "Electrical Outlet Campaign." The object is to make a survey on national lines of the present position, and to emphasise the importance of the woman's point of view to the responsible authorities. It is pointed out that while the new Electricity Act sets out to bring in the course of time electricity within the reach of every home-maker in the country, a supply of electricity will be of little avail if the house is not already provided with the facilities for using the power. For electricity to be a real servant of the woman in the home, not only must the house be wired for heat and light, but there must be in each room, and especially in the woman's workshop, the kitchen, an adequate number of wall plugs, conveniently placed so that she may use any desirable electrical apparatus. It is with new houses that the campaign is mainly concerned.

The suggested order of the campaign is as follows:—

(1) Headquarters shall issue a plan of an ordinary type of house now being commonly erected. Each branch shall call a meeting of its members with a view to discussing the number and position of electrical "outlets" required in each room. Upon receipt of suggestions from the branches, headquarters will draft a "National Women's Specification."

(2) Having decided on these points, the meeting shall then be asked for volunteers, who will visit housing estates in the district with a view to obtaining information asked for on a proposed questionnaire.

(3) The information received is to be classified and sent to the main council for consideration.

(4) The branch councils shall then arrange deputations to the local housing authorities, pointing out the discrepancy between the needs of the home-maker, as indicated by the "National Women's Specification," and the provisions being made to meet these needs. Local conferences should also be arranged with builders and architects and other responsible authorities.

(5) Finally, when all evidence has been collected and tabulated, the Association will seek an interview with the Minister of Health.

(6) On the electrical side a deputation will be arranged to wait on the Central Electricity Board to ask what steps it can take in helping forward this idea, and also to the Institution of Electrical Engineers, the British Engineering Standards Association, the Electrical Contractors' Association, and other electrical organisations, to ask for their assistance in promoting the use of standardised plugs and sockets for domestic purposes.

The Association of Supervising Electrical Engineers.

On Saturday, February 18th, the annual dinner and musical evening of the Association was held at the Holborn Restaurant, London, the president, Mr. A. M. Sillar, M.Inst.C.E., being in the chair. There was a record attendance, some 260 members and guests being present, the latter including many of the most eminent electrical engineers.

After the loyal toast, Mr. F. GILL, M.Inst.C.E., a past-president of the Association, proposed "Our Guests" in a humorous speech, in the course of which he addressed some searching questions to certain guests. Responding, Sir ANDREW DUNCAN, chairman of the Central Electricity Board, bore witness to the merits of the Association, and expressed especial pleasure at being present on that occasion. Referring to the South-East England Electricity Scheme, now adopted by the Board, he said that as the result of discussions with those concerned, on the whole they had satisfactorily settled their differences; the sooner talking ended and work began the better it would be for everybody.

Mr. A. PAGE, president I.E.E., proposed "The Association," and expressed approval of its change of name. He hoped that the preference that was shown by employers for members of the Association was reflected in the remuneration they received, and, in view of the attention they had given to economic problems, he suggested for their slogan "Economy and Efficiency." Acknowledging the excellent work the Association had done in connection with the I.E.E. wiring rules, he congratulated it on its policy and record, and expressed the view that the outlook was full of promise; the public realised the advantages of electricity, and the lot of the electrical engineer was a happy one—but he must keep abreast of the times.

Responding to the toast, Mr. A. M. SILLAR mentioned the remarkable meeting at the Institution last week, when Mr. Page presided both in London and in New York. All the past-presidents of the Association (except the late Major T. Vincent Smith) were present at the dinner. That the Association was able to retain the interest of such men was exceedingly creditable to it, and during his own occupancy of the chair he had learnt to appreciate its merits more than ever.

Mr. L. W. MEDCALF, chairman of the Association, responded, remarking that their determination to admit to membership only men of the best class had enabled them to attract men of ability and efficiency. Recently a new class of membership had been formed for commercial engineers, whose response had been good. Sections had been opened for operatives, and employers might become honorary members. The progress of the Association had been such that it had been necessary to appoint a full-time assistant secretary.

The toast of "The Electrical Industry" was proposed by Mr. A. H. DYKES, M.Inst.C.E., who foresaw that there would be plenty of wiring to do, bringing prosperity to the industry and to the members of the Association. Mr. ALAN KIRK, A.M.I.E.E., past chairman, in the course of his response, said the Association was taking steps with a view to the reform of the system of apprenticeship.

The President proposed the health of Mr. A. BRAMMER, the secretary, paying a tribute to his efficiency, and Mr. Brammer, acknowledging the toast, referred to the work accomplished by those who remained in the background. During the evening an excellent musical programme was performed, and the proceedings were very lively and enjoyable.

Meter Engineers' Technical Association.

The eleventh general meeting of the above Association was held at the E.L.M.A. Lighting Service Bureau, London, on February 17th, when a paper was read by Mr. R. G. Isaacs, M.Sc., on "Metering Rectifier Loads." The author dealt exclusively with the question of metering the supply to the rectifier, *i.e.*, the a.c. input, and gave results of investigations which led to the conclusion that a rectifier load producing distortion in the current wave would be accurately metered provided the meter employed was independent of power-factor variations, and that the voltage wave was not distorted. Further investigations seemed to prove that the power factor could not at present be accurately measured by integrating instruments, such as sine meters or the so-called kVA meters. Even the generally accepted "two-wattmeter" method of arriving at the power factor of a three-phase load was shown to be inaccurate under certain conditions, and the author demonstrated that, for accurate results, it was essential to take account of the "deformation" factor, dependent on wave form, as well as the displacement factor, *i.e.*, the cosine of the angle of lag, before the true power factor could be obtained. Where a power-factor clause appeared in a contract, the methods generally employed to ascertain the average power factor resulted in a figure in favour of the consumer.

In a discussion on the paper, Mr. E. W. Hill commented upon the fact that the paper indicated the wide range of problems open to meter engineers. He had been under the impression that the paper would deal with the output side of rectifiers, and suggested that even the metering of such unidirectional current might be worthy of investigation. It was reassuring to learn that ordinary induction-type meters would accurately register the consumption on the a.c. side of rectifiers.

Mr. R. Hornby said that the paper merely touched on the fringe of a subject which was increasing in importance every day, and which was likely to be considerably extended in the near future. Mr. Isaacs had done good service in pointing out that distortion did exist even in voltage waves. He stressed the importance of the inclusion of an oscillograph in all up-to-date supply authorities' test rooms.

The president pointed out that power-factor clauses and kVA tariffs were instituted to cover losses due to the heating effect on cables and generators, and any distortion of the current wave considerably increased such heating. He had noted as much as 11 per cent. increase, due entirely to wave distortion. Touching on the question of accurate kVA measurement, he compared the American practice of taking the vector sum of the quantities against the usual method employed in this country of arriving at the figure arithmetically; he was distinctly in favour of the latter.

Appointments Vacant.

Manager for the Electrical Department of the Falkirk Iron Co., Ltd. Assistant mains and consumers' engineer (£275) for the City of Winchester Electricity Department. Assistant electrical engineer (£450) for the Public Works Department, Government of Nigeria. Assistant mains engineer (£351) for the Borough of Ashton-under-Lyne Electricity Department. Charge engineer for the Lancashire United Transport and Power Co. Two junior charge engineers (350 taels per month, tael=2s. 6d.) for the Shanghai Municipal Electricity Department. Draughtsmen for the Royal Aircraft Establishment, South Farnborough. Junior assistant engineer (£335) for the Battersea Borough Council Electricity Department. (See our advertisement pages to-day.)

Ex-British Westinghouse Association.

At the tenth anniversary celebration next Friday (at the Hotel Cecil, London) Mr. A. McKinstry will preside, and a record attendance is expected.

Institution Notes.

Institution of Chemical Engineers.

The annual meeting of the Institution of Chemical Engineers will be held on March 8th and 9th next, at the New Princes' Restaurant, London. On the second evening the annual dinner will be held. Included in the list of papers which are to be read during the meeting are: "The Theory of Magnetic Separation," by Prof. B. W. Holman (Royal School of Mines); and "The Combustion of Powdered Coal; the influence of the degree of fineness of the particles," by Dr. Burrows Moore, M.Sc.

Institution of Mechanical Engineers.

The annual report of the Council of the above Institution for the year 1927 shows that at the end of the year the total membership was 10,256, representing an increase of 139 during the year. The income for the year amounted to £31,924, which resulted in an excess over the total expenditure of £711 being carried to the balance sheet. A grant of £500 has been made to the British Engineering Standards Association.

Institution of Electrical Engineers.

A.M.I.E.E EXAMINATION.—The next examination will be held on May 23rd, 24th and 25th. Entry forms for the examination, which must be completed and returned by April 1st, and particulars regarding election to membership of the Institution, may be had on application to the secretary.

A further list has been received, containing the names of seven candidates overseas who have passed the whole examination, and four who have passed part only.

SUMMER MEETING.—This year the summer meeting of the Institution is to be held in Norway, from June 9th to June 24th. The party will leave Newcastle on Saturday, June 9th, and will visit the Bergen National Exhibition, the funicular railway, &c., on Monday, June 11th. Next day it will proceed to Dale, where the hydro-electric works will be seen, and to Eide and Ulvik. On Wednesday a steamer will take the members to Björlvefoss hydro-electric works, and on to Tyssedal and Odda, where the zinc-smelting, carbide and aluminium factories and power houses will be visited. Returning next day to Eide and Ulvik, on Friday, June 15th, the party will go to Voss by motor-car, and thence by train to Oslo, which will be the headquarters from Saturday to Wednesday, June 20th. From Oslo visits will be made to the works at Rjukan, Vamma and Solbergfos, and possibly to Ranasfos and Nore. Leaving Oslo on Thursday, June 21st, the party will go by train to Gothenburg, inspecting the hydro-electric works at Tröllhättan in Sweden on the way, and on Friday afternoon the return journey will commence, by way of Hamburg and Hook of Holland, London being reached early on Sunday morning, June 24th. The cost of travelling is estimated at about £23 per person, exclusive of hotel accommodation and meals, which are said to cost about £1 per day.

Institute of Marine Engineers, Inc.

The annual report of the Institute shows that at December 31st, 1927, there was a total membership of 3,162, as compared with 3,024 for the previous year.

The Physical Society.

The thirteenth Guthrie Lecture is to be given by Sir Joseph Thomson, O.M., F.R.S., on "Electrodeless Discharge through Gases," on Friday, March 9th, at the Imperial College of Science and Technology, South Kensington, commencing at 5 o'clock. No tickets are required.

Our Personal Column.

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements.

The Rothesay Town Council has appointed Mr. W. K. FLEMING burgh electrical engineer at a salary of £320, rising to £400. Mr. Fleming has been vice-president of the Greenock Association of Electrical Engineers and of the Greenock and District Electrical Club, as well as secretary of the Greenock E.D.A. Circle.

At last week's meeting of the Huddersfield Town Council a recommendation that the salary of the electrical engineer (Mr. J. W. TURNER) should be increased from £900 to £1,000 was approved.

Mr. H. H. BROUGHTON, M.I.Mech.E., M.I.E.E., 33, Henrietta Street, W.C.2, has been appointed agent for the British Empire by the Brünner Turbine & Equipment Co. (Erste Brünner M-F-G), Brno, Czecho-Slovakia. Mr. Broughton will continue to practise as consulting engineer, specialising on grain storage and handling, electric winding, and other mechanical handling problems.

The Crown Agents for the Colonies have appointed Mr. N. S. SNELLING, A.M.I.Mech.E., resident engineer for the construction of the new Kolonnawa power station and the electrical distribution in Colombo under the Government of Ceylon's electrical undertakings. Mr. Snelling expects to sail for Colombo about the middle of next month.

Mr. G. F. GLASS, late traffic superintendent of the Bournemouth Corporation Tramways, has been presented by his colleagues with an eight-day clock.

Amongst fifteen nominations by the Council of the Royal Society for election as Fellows, we note the names of Mr. W. D. Dye, B.Sc., A.C.G.I., head of the electrical standards and measurements section of the National Physical Laboratory; and Mr. Stanley S. Cook, of Newcastle-on-Tyne, whose interests are connected with the steam turbine.

The marriage took place, at Blackheath, S.E., on February 11th, of Mr. J. H. BEAUMONT-ROLIERS, A.M.I.E.E., and Miss M. REES, of Lee, S.E.

The St. Pancras Parliamentary and General Purposes Committee has confirmed a recommendation of the Electricity Committee that Mr. J. T. BARON, M.I.E.E., deputy electrical engineer, shall be appointed chief electrical engineer, in succession to Mr. S. W. Baynes, at an inclusive salary of £1,200 for a period of one year, "and that the appointment shall be continued from time to time as the Council may deem expedient."

The Messel Medal of the Society of Chemical Industry has been awarded to Dr. R. A. MILLIKAN, in recognition of his achievement in measuring the electrostatic charge of an electron and obtaining reliable results.

We are glad to report that since last Saturday Mr. P. F. ROWELL, secretary of the Institution of Electrical Engineers, has been making satisfactory progress towards recovery from his serious illness.

Obituary.—MR. ALEXANDER SIEMENS.—It has probably fallen to few men to be for so long a period prominently associated with electrical science and industry in these islands as occurred in the case of Mr. Alexander Siemens, who passed away at his home, Westover, Milford-on-Sea, on February 16th. Mr. Siemens was born in Hanover in 1847. He came to England and joined the firm of Siemens Bros. in 1867. He assisted in erecting the Indo-European telegraph line in 1868, and in laying cable in the Black Sea in 1869. In the early 'seventies he worked as a pupil of the late Sir William Siemens, assisting in building regenerative gas furnaces and in laying submarine cables from 1875 onwards. He built furnaces for Sir William in Canada and the United States in 1876-77.

The Late Mr. Alexander Siemens.

About 1879 he took over the management of Siemens Bros'. Electric Light Department and installed the electric lighting equipment in the Albert Hall and the British Museum Reading Room; he also carried out the electric town lighting installation at Godalming in Surrey, this being the first town in England to have electric lighting. Mr. Siemens became a naturalised British subject in 1878. He was elected a director of Siemens Bros. & Co., Ltd., in 1887, and occupied that position for 31 years. On the occasion of his retirement from the company he was presented with a clock and an address containing the names of over 1,100 of the employés of the company. He was twice president of the Institution of Electrical Engineers, namely, in 1894 and 1904, and was president of the Institution of Civil Engineers in 1910-11. At various times he read papers before the British Association, the Society of Arts, and the Institution of Electrical Engineers. In 1881 he married Frances Dodwell, of Campden, Gloucestershire. He is survived by his wife and three daughters.

The accompanying portrait was made some years ago.

MR. G. E. PHILLIPS.—The death occurred on February 12th, at Redruth, of Mr. George Eliot Phillips, resident engineer of the Victoria Falls power station, Rosherville, Johannesburg. Mr. Phillips came home with his wife and family in May last, intending to return to South Africa in October. He had spent 25 years in South Africa, and had been resident engineer at the Victoria Falls station for 19 years.

MR. J. L. BROWN.—We regret to record the death, in his 65th year, of Mr. John Leslie Brown, who was for many years Sectional Engineer, London Telephone Service. Mr. Brown passed away on February 20th at 102, Alexandra Road, St. John's Wood, N.W.8, and is to be buried at Hampstead Cemetery to-day at 11.30 a.m.

Wills.—The late Mr. CHARLES DAY, a director of Waygood-Otis, Ltd., left £27,505 (net £27,084).

The late Mr. F. E. GRIPPER, of Edmundsons' Electricity Corporation and associated companies, left £13,435 gross and £11,362 net personalty.

Financial Section.

New Companies, Returns of Share Capital, Debenture Changes, Reports of Electrical Companies, Dividend Results, Transactions in Stocks and Shares.

New Companies Registered.

Radiant Advertising Co., Ltd.—Private company. Registered February 15th. Capital, £500 in £1 shares. Objects:—To carry on the business of manufacturers of daylight and night signs and all kinds of apparatus, appliances, plant and material used by advertising contractors, and also radio instruments and appliances, advertising agents, &c. The first directors are:—A. W. Matthews, "Ken-tor," Coleridge Road, Cambridge; P. R. Biggs, 5, Victoria Street, Cambridge; W. T. F. Hardesty, "Woodberry," Hills Road, Cambridge; W. A. Dickinson, Hewson House, West Parade, Lincoln. Registered office: 23, St. Andrew's Street, Cambridge.

Holderness Trust, Ltd.—Private company. Registered February 13th. Capital, £5,000 in £1 shares. Objects:—To carry on business as an electric, hydro-electric, hydraulic, and other power and lighting supply company; to act as railway and tramway contractors, financiers, concessionaries, merchants, &c. The subscribers (each with one share) are:—N. De Maid Watsham, Windsor House, Victoria Street, S.W.1, engineer; W. M. F. Corry, 114, Eaton Square, S.W.1, director of Welsh, Pearson & Co., Ltd. Solicitors: Rhys Roberts & Co., 2-3, Salisbury Court, Fleet Street, E.C.4.

Stereoscopic X Rays, Ltd.—Private company. Registered February 15th. Capital, £5,000 in £1 shares (3,500 8 per cent. cumulative preference and 1,500 ordinary). Objects:—To carry on the business of sole agents in Great Britain and the British Colonies for the sale of X-ray stereoscopic diagnosis machines, to adopt an agreement with the Friho Manufacturing Co., Ltd., and to carry on the business of manufacturers of, agents for, and dealers in, surgical, dental, medical, electrical, and scientific and other instruments, and to establish sunlight or ultra-violet-ray and other clinics, &c. The permanent directors are:—Lt.-Col. G. Hutchinson, D.S.O., M.C. (chairman), The Old Garden, Hillingdon, Middlesex (director of Walker (London), Ltd.); H. F. E. Aderholdt, 24, Belsize Grove, N.W.3; A. T. K. Moir, 46, Western Road, Lewisham, S.E.13. Solicitors: Porter & Weller, 17, Soho Square, W.1. Registered office: 283, City Road, E.C.1.

Physical Treatment Institutes, Ltd.—Private company. Registered February 16th. Capital, £100 in £1 shares. Objects:—To carry on institutes for the physical treatment of disease, particularly by means of light and heat radiation, including sunlight, artificial sunlight, and ultra-violet-ray treatment, &c. The subscribers (each with one share) are:—E. S. M. Perowne, 7, Great James Street, Bedford Row, W.C.1, solicitor; G. T. Heard, 23, Harewood Road, Colliers Wood, S.W.18, solicitor's managing clerk. The first directors are Dr. H. Munro (permanent), subject to holding 10 per cent. of the shares to be allotted to him) and others to be appointed by the subscribers. Solicitors: Perowne & Co., 7, Great James Street, Bedford Row, W.C.1.

Television Supplies, Ltd.—Private company. Registered February 14th. Capital, £2,100 in 2,000 ordinary shares of £1 each and 2,000 deferred ordinary shares of 1s. each. Objects:—To carry on the business of electrical engineers, manufacturers of, and dealers in, electrical apparatus of all kinds, including television and radio apparatus and components, accessories, &c. The subscribers (each with one share) are:—F. A. Smith, 22, Victoria Avenue, Saffron Walden, librarian; D. A. Scott, 12, Dewey Street, Tooting, S.W.17, law typist. Solicitor: K. Thomas, Lennox House, Norfolk Street, W.C.2.

North-East Coast Engineering Services, Ltd.—Private company. Registered February 15th. Capital, £1,000 in £1 shares. Objects:—To carry on the business of radio, electrical, mechanical, motor and general engineers, motor garage proprietors, brass finishers, metal workers, &c. The subscribers (each with one share) are:—Mrs. A. M. Burdick, 40, Ewesley Road, Sunderland; C. F. Armstrong, 26, Wreath Quay Road, Sunderland, engineer. Mrs. A. M. Burdick is the first permanent director. Qualification, £50. Secretary: C. F. Armstrong.

Brown & Co. (Electrical Engineers), Ltd.—Private company. Registered February 11th. Capital, £5,000 in £1 shares. Objects:—To acquire the business of an electrical engineer and contractor now carried on by H. Le Mare Jackson at 17, Newton Street, Manchester, as "Brown & Co." The first directors are:—H. Le Mare Jackson, 67, Davenport Crescent, Stockport; F. Frankish, 17, Lathom Road, Withington, Manchester.

Remax, Ltd.—Private company. Registered February 11th. Capital, £3,000 in £1 shares. Objects:—To acquire the business of manufacturers of, and manufacturers' agents for, motor, electrical and ignition appliances and accessories, &c. The first directors are:—A. S. Gregg (permanent chairman and managing director), 22, Park Crescent, Finchley, Middlesex); C. H. Nash, 436, Alexandra Park Road, Wood Green, N. Registered office: 44, Bedford Row, W.C.1.

Simpler Wireless, Ltd.—Private company. Registered February 11th. Capital, £250 in 1s. shares. Objects:—To carry on the business of radio apparatus manufacturers and dealers, manufacturers of, and dealers in, gramophones and all kinds of musical instruments, cabinet makers, &c. The subscribers (each with 10 shares) are:—D. A. Jacobs, C.A., and J. K. K. Howat, accountant's clerk, 39, Berners Street, W.1. The first directors are to be appointed by the subscribers. Qualification, 100 shares. Secretary: D. A. Jacobs. Registered office: 39, Berners Street, W.1.

Apex Magneto Co., Ltd.—Private company. Registered February 17th. Capital, £1,600 in 1,000 "A" ordinary shares of £1 each and 12,000 "B" ordinary shares of 1s. each. Objects: To carry on the business indicated by the title and that of electrical, mechanical, general, radio and automobile engineers, manufacturers of and dealers in electrical and mechanical goods, &c. The first directors are:—C. Valentine, 37, Delamere Road, Flixton, electrical engineer; P. S. Clark, 85, Hawthorn Road, Chorlton-cum-Hardy, Manchester, electrical engineer; J. Kershaw, 10, Buxton Avenue, West Didsbury, Manchester. Secretary (*pro tem.*): P. S. Clark. Registered office: 31a, King Street, Stretford, Lancashire.

Klovak, Ltd.—Private company. Registered February 17th. Capital, £3,000 in £1 shares. Objects: To acquire certain patents for inventions relating to the manufacture of electrical washing and wringing machines, and to adopt an agreement with F. Elgie. The subscribers (each with one share) are: Fredk. Elgie, 6, St. Mary's Walk, Harrogate, accountant; G. Hill, 4, Stonegate Square, Meanwood, Leeds, engineer. The first directors are Fredk. Elgie and Fannie Elgie (both permanent). Qualification, £100. Secretary: Fredk. Elgie.

Official Returns of Electrical Companies.

Electric Reduction Co., Ltd.—Capital, £50,000 in 16,200 preference and 33,800 ordinary shares of £1 each. Return dated November 22nd, 1927. 16,200 preference and 28,800 ordinary shares taken up. £18,000 paid on 13,000 preference and 5,000 ordinary shares. £27,000 considered as paid on 3,200 preference and 23,800 ordinary shares. Mortgages and charges, £25,000.

Van Raden & Co., Ltd.—Capital, £10,000 in £1 shares. Return dated November 30th, 1927. 6,754 shares taken up. £4,654 paid. £2,100 considered as paid. Mortgages and charges: Mortgage, £1,800; debenture, £1,200; and loan, £1,750.

Price's Electrical Supplies, Ltd.—Capital, £3,000 in £1 shares. Return dated November 11th, 1927. 1,210 shares taken up. £1,210 paid. Mortgages and charges, nil.

British Electric Traction Co., Ltd.—Capital, £2,998,397 15s. in £712,744 5s. 6 per cent. cum. pref. stock, £1,326,263 10s. preferred ordinary stock, £132,626 deferred ordinary stock, £287,256 £1 6 per cent. preference and £539,508 £1 ordinary shares. £2,171,633 15s. stock taken up. £2,039,007 15s. paid. £132,626 considered as paid. Mortgages and charges, £1,620,012.

Grierson, Ltd.—Capital, £10,000 in 4,000 preference and 6,000 ordinary shares of £1 each. Return dated December 20th, 1927. 2,501 ordinary shares taken up. £2,501 paid. Mortgages and charges, nil. Return of allotments, made up to January 10th, 1928, shows a further 1,500 ordinary shares allotted for cash and fully called up.

Rhayader Electric Light and Power Co., Ltd.—Capital, £2,000 in £5 shares. Return dated September 5th, 1927. 400 shares taken up. £2,000 paid. Mortgages and charges at date of return, £300. Since registered: £325 debentures (part of £1,000 authorised), issued October 12th, 1927.

Hewittic Electric Co., Ltd.—Capital, £50,000 in £1 shares. Return dated October 13th, 1927. 40,000 shares taken up. £40,000 paid. Mortgages and charges, £25,000.

C. F. Casella & Co., Ltd.—Capital, £17,000 in ordinary and 2,000 preference shares of £1 each. Return dated August 10th, 1927. 12,204 ordinary and 2,000 preference shares taken up. £3,504 paid. £10,700 considered as paid. Mortgages and charges, £1,500.

Vactite Wire Co. (1919), Ltd.—Capital, £25,000 in £1 shares. Return dated December 1st, 1927. 15,000 shares taken up. £3 paid. £14,997 considered as paid. Mortgages and charges, nil.

Drake & Gorham, Ltd.—Capital, £125,000 in £1 shares. Return dated November 8th, 1927. All shares taken up. £85,000 paid. £40,000 considered as paid. Mortgages and charges, £12,000.

Naider Bros. & Thompson, Ltd.—Capital, £30,000 in 15,000 preference and 15,000 ordinary shares of £1 each. Return dated December 21st, 1927. 12,000 preference and 11,881 ordinary shares taken up. £13,881 paid. £10,000 considered as paid. Mortgages and charges, nil.

Sussex Electricity Supply Co., Ltd.—Capital, £20,000 in £1 shares. Return dated June 28th, 1927 (filed January 2nd, 1928). 18,049 shares taken up. £18,049 paid. Mortgages and charges, £10,000.

Dental and General Radiography, Ltd.—Debenture dated February 4th, 1928, to secure £500, charged on the company's undertaking and property, present and future, including uncalled capital. Holder:—F. Daphne, 10, Charterhouse Square, E.C.

Oswestry Electric Lighting and Power Co., Ltd.—Particulars filed of £4,000 debentures authorised February 2nd, 1928, charged on the company's property, present and future, including uncalled capital, the amount of the present issue being £1,000.

Satisfaction in full on February 2nd, 1928, of debentures dated January 10th, 1922, securing £800.

Auto-Bulbs, Ltd.—R. F. W. Fincham, F.C.A., of 3, Warwick Court, Gray's Inn, W.C.1, was appointed receiver and manager on February 7th, 1928, under powers contained in debenture dated July 19th, 1926.

Dartmoor Electric Supply Co., Ltd.—T. W. W. Melhuish, of 21, St. Leonard's Road, Exeter, was appointed receiver on February 2nd, 1928, under powers contained in debenture dated August 14th, 1914.

Meifod Electricity Co., Ltd.—Particulars filed of £1,400 debentures authorised January 27th, 1928, charged on the company's property, present and future, including uncalled capital, the whole amount being now issued.

Beko Lamp Co., Ltd.—A. R. Green, F.S.A.A., of 100-106, Moorgate Station Chambers, E.C.2, was appointed receiver and manager on February 3rd, 1928, under powers contained in debenture dated February 18th, 1927.

Radio Communication Co., Ltd.—Satisfaction in full on February 3rd, 1928, of debenture dated April 14th, 1926, securing £81,500 (£10,000 outstanding).

Salcombe Gas and Electricity Co., Ltd.—Mortgage on freehold property, known as Gas Works, Salcombe, dated January 16th, 1928, to secure all moneys due or to become due from the company to Lloyd's Bank, Ltd., not exceeding £1,000.

Electric Light Insurance and Maintenance Co., Ltd.—Issue on January 18th, 1928, of £50 debentures, part of a series already registered.

J.J.R., Ltd.—Particulars filed of £250 debentures authorised January 27th, 1928, charged on the company's property and assets, present and future, including uncalled capital, the whole amount being now issued.

Smith & Sturt, Ltd.—Second debenture dated January 23rd, 1928, to secure £200, charged on the company's undertaking and property, present and future, including uncalled capital. Holders:—F. C. Smith, "La Mina," Rancagua, Chile; and W. E. Jenkins, "Hazlemere," Four Ashes, Dorridge, Warwickshire.

Kirk Wilson, Ltd.—Mortgage dated January 31st, 1928, to secure £2,800, charged on land, with bowling green and garage thereon, in Wragby Road, Lincoln. Holders:—E. C. Midgley and J. W. F. Hill, solicitors, of Silver Street, Lincoln.

Erith Electrical Co. (Barber & White), Ltd.—Debenture dated January 25th, 1928, to secure £300, charged on the company's undertaking and property, present and future, including uncalled capital. Holder:—J. Carey, East Hill, Kemsing, Kent.

J. L. Gottlieb, Ltd.—Debenture charged on the company's undertaking and property, present and future, including uncalled capital, dated January 30th, 1928, to secure all moneys due or to become due from the company to Lloyd's Bank, Ltd.

Rose Bros. Electrical Co., Ltd.—T. G. Weavers, of 5, Budge Row, E.C.4, ceased to act as receiver or manager on February 8th, 1928.

Currys (1927), Ltd.—Mortgage dated February 9th, 1928, to secure £3,680, and further advances charged on certain properties in Long Eaton. Holders: Bradford Third Equitable Benefit Building Society.

Premier Wholesale Electric Co. (Stockport), Ltd.—Capital, £2,000 in £1 shares. Return dated September 27th, 1927. 1,200 shares taken up. £750 paid (being 17s. 6d. per share on 800 shares, plus £50 paid on 100 forfeited shares). £400 considered as paid on 400 shares. Mortgages and charges, £283 13s. 11d.

Bective Electrical Co., Ltd.—Capital, £6,000 in 116 preference shares of £50 each and 4,000 ordinary shares of 1s. each. Return dated November 18th, 1927. 56 preference and 4,000 ordinary shares taken up. £3,000 paid. Mortgages and charges nil.

Wallace Magneto Repairing Co., Ltd.—Capital, £2,000 in 800 preference shares of £1 each and 2,400 ordinary shares of 10s. each. Return dated August 29th (filed November 7th), 1927. All shares taken up. £2,000 paid. Mortgages and charges nil.

Robson, Paling & Co., Ltd.—Capital, £2,000 in £1 shares. Return dated December 31st, 1927. 1,380 shares taken up. £600 paid. £780 considered as paid. Mortgages and charges nil.

City Notes.

The "Underground" Group.

The dividends of the companies forming this group were mentioned in our last issue. The meetings were to be held yesterday (Thursday), and we reproduce the substance of the reports which were to be presented:—

London Electric Railway Co.—The total operating income increased by £235,359 to £2,213,886, and after crediting miscellaneous receipts and deducting expenses, the net income was £212,888 higher at £1,222,396. Adding the balance brought forward (£100,515), the amount available was £1,322,911. Interest rentals and other fixed charges absorbed £589,745 and £75,000 (against £45,000) was transferred to reserve, and after the payment of dividends a balance of £158,101 is carried forward. The capital expenditure during the year was £506,446, the bulk of which was spent on rolling stock, the Charing Cross-Kennington extension, and the reconstruction of Piccadilly Circus station. The directors have decided to replace the original rolling stock with stock of the latest type.

Central London Railway Co.—The total operating income was £573,683, an increase of £19,890, and the total net income was £15,333 higher at £289,295. A balance of £70,847 brought forward is added, making £360,142. After meeting fixed charges, transferring £40,000 to reserve (against *nil* in 1926), and paying dividends, a balance of £98,926 is carried forward. The capital expenditure totalled £70,965, the principal item being additions and improvements to rolling stock. The report

refers to the death of the deputy-chairman (Lord George Hamilton), and states that the modernisation of the rolling stock is practically completed.

City and South London Railway Co.—The traffic receipts rose by £244,309 to £897,238, and the total net income by £117,994 to £480,243, to which is added £29,327 brought forward, making £509,570. After meeting fixed charges and dividends and transferring £25,000 (against *nil*) to reserve, a balance of £33,157 is carried forward. The capital expenditure during the year was £94,899, the largest component being £87,299 in respect of the Clapham Common-Morden extension.

Metropolitan District Railway Co.—The total receipts increased by £79,187 to £1,719,852 and the total net income by £73,706 to £783,704. A balance of £41,502 brought forward is added, making £825,206. The amount carried forward, after meeting fixed charges and dividends and placing £45,000 (against *nil*) to reserve, is £38,161. The capital expenditure is given as £309,252; the new office building accounted for £149,123, and repair works for £115,941. During the year £750,000 of 5 per cent. redeemable debenture stock was issued for capital requirements. A programme for the partial replacement of the older types of rolling stock has been arranged. The report notes the appointment of Lord Colwyn to the board in the place of the late Lord George Hamilton.

Summary of Results.—We reproduce below a comparative statement of the four companies, which, with the London General Omnibus Co., Ltd., participate in the Common Fund :—

	1927.	Inc. or dec.
	£	£
Traffic receipts	5,404,659	+578,745
Expenditure	3,225,350	+217,454
Net receipts	2,179,309	+361,291
Miscellaneous receipts (net) ...	596,329	+ 58,630
Net income	2,775,638	+419,921
Interest, rentals, and other fixed charges	1,433,289	+210,669
Appropriation to reserve for contingencies and renewals ...	185,000	+ 30,000
Dividends on guaranteed and preference stocks	389,477	—
Balance	767,872	+179,252
Add Balance from last year's accounts	242,191	- 15,482
Total amount available for dividends on ordinary stocks and shares and for other purposes	1,010,063	+163,770
Dividends on ordinary stocks and shares	681,718	+ 77,615
Rate per cent. per annum	4	+ 0.46
Balance carried forward	328,345	+ 86.155

Traffic Figures.—As will be seen from the table below, there was a general increase in the volume of traffic :—

	1927.	Increase.
Passengers carried—		
Ordinary	234,594,270	24,124,062
Workmen	57,872,186	7,291,622
Seasons	52,936,754	4,209,252
Total	345,403,210	35,624,936
No. of car miles run	86,038,811	13,731,157

Metropolitan Railway Co.

The directors' report for the year ended December 31st, 1927, shows gross receipts of £1,826,369 and a net income of £838,862. The balance brought forward is £22,211, making available £861,073. Interest, &c., and appropriation to general reserve (£10,000) require £342,986, and the preference dividends £264,263. The total dividend on the ordinary stock for the year, as already reported, is 3 per cent., and £26,464 is carried forward. The same dividend was paid for the preceding year, but £100,000 was taken from reserves. The Surplus Lands Stock dividend is maintained at £3 12s. 6d. per cent. The report records progress in the reconstruction of stations; the new 15,000-kW turbo-generator at Neasden has proved satisfactory, and a 20,000-kW set has been ordered from the Metropolitan-Vickers Electrical Co., Ltd., to replace another of the old 5,000-kW sets. The new set is in course of erection. In common with the other railway companies, the company proposes to promote a Road Transport Bill, and shareholders were to be asked for their approval of this step at the annual meeting yesterday (Thursday).

Westminster Electric Supply Corporation, Ltd.

The directors' report for 1927 shows a net profit of £169,622, to which is added £1,503 brought forward, making £171,125. The preference dividend and the standard ordinary dividend (1s. 9.12d. per share) are paid, and £35,551 is carried forward, subject to adjustment on the fixing of the standard prices by the Electricity Commissioners. The number of meters connected rose from 27,839 to 29,600, and the amount of energy sold from 44,594,030 to 54,622,781 kWh. The report mentions the retirement of Mr. W. A. Pearman, after 37 years with the company, in order that he may devote the whole of his time to the office of general manager and secretary of the London Power Co., Ltd. His successor as secretary is Mr. C. Parker. The directors do not propose for the present to fill the vacancy on the board. Meeting: February 29th.

Northampton Electric Light and Power Co., Ltd.

The directors' report for the year ended December 31st last shows a total income of £161,847, and a net revenue of £71,858, after providing about £30,000 for depreciation. After meeting debenture interest, &c., and adding income from investments (£3,209), the balance of the debenture stock discount and expenses account (£7,230) is written off, £9,849 is transferred to general reserve, £1,000 to the battery suspense account, and £1,000 to the employés' benevolent fund. A final dividend of 5 per cent. on the old ordinary shares is recommended, making 9 per cent. for the year (as for 1926), and £9,910 is carried forward. Good progress is recorded in the old districts, and it is stated that the company commenced to supply in Bletchley, Stony Stratford, Towcester, Long Buckby, and several villages during the year. The maximum load rose to 12,395 kW, and the amount of energy sold increased from 18,471,276 kWh to 22,578,800 kWh. As reported in our last issue, proposals were to be made after the annual meeting on Tuesday last for the elimination of the "A" shares. The new capital will consist of 52,500 five per cent. cumulative preference shares and 447,490 ordinary shares of £1 each. Ten "A" shares will be surrendered and cancelled. It is then proposed to create 22,500 new five per cent. cumulative preference shares and 177,510 ordinary shares of £1 each, raising the capital to £700,000.

Rushden and District Electric Supply Co., Ltd.

The total income for the past year was £18,846, and the net revenue, after providing for depreciation, £5,649. From this debenture charges are met, £250 is written off debenture expenses, and £448 is transferred to the reserve fund. It is proposed to pay a final dividend of 4½ per cent., making 8 per cent. for the year, as in 1926; £948 is to be carried forward. During the year the supply was extended to Thrapston and Ringstead. The amount of energy sold rose from 1,300,823 kWh to 1,602,759 kWh.

Wellingborough Electric Supply Co., Ltd.

The accounts for the year ended December 31st last show an income of £18,214 and a net revenue (after allocating £4,000 for depreciation) of £4,400. After meeting debenture charges, &c., there was a net profit of £3,170, to which was added £2,146 brought forward, making £5,316. From this £1,000 is put to reserve and a dividend of 5 per cent. is to be paid, leaving £2,066 to be carried forward. The sales rose from 1,066,479 kWh to 1,285,802 kWh.

Stock Exchange Notices.

Dealings in the following have been specially allowed by the Committee under Rule 159 :—

Altrincham Electric Supply, Ltd.—45,000 6 per cent. cumulative preference shares of £1 each, fully paid, Nos. 1 to 45,000. 53,350 7 per cent. second cumulative preference shares of £1 each, fully paid, Nos. 1 to 53,350.

Oxford Electric Co., Ltd.—100,000 new ordinary shares of £1 each, issued at £1 5s. per share, 2s. paid, Nos. 100,001 to 200,000.

St. James' & Pall Mall Electric Light Co., Ltd.

The accounts for the year ended December 31st last record a net profit of £123,933, to which is added a balance brought forward of £17,774, making £141,707. After paying the preference dividend and the standard dividend of 1s. 6.949d. per share on the ordinary shares, £81,807 remains to be carried forward. The report states that the Earl of Lytton has been appointed a director. The connections increased during the year from 29,391 to 31,733 kW, and the sales of energy from 24,220,469 to 28,414,097 kWh. Meeting: February 28th.

Southern Brazil Electric Co., Ltd.

Last week this company published a statement, for information only, containing particulars of £200,000 7 per cent. prior lien debenture stock issued at 94 per cent. The stock is secured by a trust deed in favour of the Metropolitan Trust Co., Ltd., and is a specific first mortgage upon the company's whole assets. The company reserves the right to issue a further £100,000 of similar stock ranking *pari passu* with the present issue. The company has an issued share capital of £507,800 and debentures of £679,950.

New Issue.

Stewarts & Lloyds of South Africa, Ltd.—On February 20th an issue of 300,000 6 per cent. cumulative preference shares of £1 each, at par, was made by this new company; the list was to close on or before Wednesday last, but the issue was oversubscribed on the first day. The company was formed to erect works in South Africa for the manufacture of steel and iron tubes, and it has acquired the distributing business in South Africa of Stewarts & Lloyds (South Africa), Ltd., a subsidiary of the English company. The total capital of the company is £755,000.

Crossley Bros., Ltd.

The net profit for the year ended December 31st last was £51,882, and to this is added £73,079 brought forward, making £124,961. The remainder of the preference dividend is to be paid, but there will be no distribution on the ordinary shares, which last received a dividend in 1920 (3 per cent.). A balance of £96,724 is carried forward.

Tyneside Tramways and Tramroads Co.

The accounts for the half-year ended December 31st last show that the surplus of receipts over expenditure was £1,142. To this are added £408 interest, a balance of £54 brought forward, and £300 from special reserve, making £1,904. The balance, after deducting loan interest, &c., is £82. For the whole of 1927 the traffic receipts at £31,532 showed a decrease of £1,054.

Clarke, Chapman & Co., Ltd.

The accounts for the past year show a net profit of £53,681, against £13,453 for 1926. Depreciation absorbs £12,431, and a final dividend of 5 per cent. is being paid on the ordinary shares, making 7 per cent. for the year (against *nil*), leaving £7,022 to be carried forward.

Launceston and District Electric Supply Co., Ltd.

A successful year's working was reported at the annual meeting on February 10th. A dividend of 8 per cent., free of tax, was declared, and it was announced that the charges for energy would be reduced from April 1st.

Mather & Platt, Ltd.

A final dividend of 5 per cent. and a bonus of 5 per cent. are recommended, making 15 per cent. (all free of tax) for the year, as in the preceding year.

Charing Cross Electricity Supply Co., Ltd.

The directors recommend a final dividend on the ordinary shares of the West End Undertakings of 10 1/16d. per share, making up the standard dividend for the year.

North Metropolitan Electric Power Supply Co.

The final dividend on the ordinary shares is 6 per cent., making 10 per cent. for the year, as for 1926.

Electrical Distribution of Yorkshire, Ltd.

A final dividend at the rate of 9 per cent. per annum has been declared, making 9 per cent. for the year (as for 1926).

Clyde Valley Electric Power Co.

The directors recommend a final ordinary dividend of 5 per cent., making 8 per cent. for the year, as in 1926.

National Gas Engine Co., Ltd.

A dividend of 5 per cent. has been declared, against 2½ per cent. for 1926.

Brown Bros., Ltd.

A final ordinary dividend of 7½ per cent. is recommended, maintaining the year's distribution at 10 per cent.

Marconi's Wireless Telegraph Co., Ltd.

The directors announce that the company has disposed of its entire interest in the Spanish and General Corporation, Ltd.

Italian Loan in New York.

It is reported that a New York firm has sold $4,000,000 first mortgage bonds (7 per cent.) of the Lombard Electric Co., Italy, at the price of 96 per cent. The issue was not a public one, but large amounts were placed in this country and on the Continent.

Italian Company.

The Rome correspondent of the *Financial Times* reports that the *Compagnia Italiana dei Cavi Telegrafice Sottomarini* (Italian Submarine Cable Company) proposes to reduce the value of its assets in accordance with the gold parity of the lira. A shareholders' meeting is convened for March 31st, when sanction will be asked for correspondingly reducing the company's capital, which is at present 300,000,000 lire, of which 250,000,000 lire is paid up. At the same meeting the re-increasing of the capital will be considered.

Swedish Company.

The directors of the *Allmanna Svenska Elektriska Bolaget* report that business in 1927 yielded a profit of 4,548,000 kr., as compared with 3,938,000 kr. in the previous year, after providing for the usual depreciation and taxes. Including the balance forward, the amount available for disposal is 4,992,000 kr., as against 4,193,000 kr. in 1926, permitting of the payment of a dividend of 6 per cent., as compared with 5 per cent. for 1926.

German Company.

The *Electro-Works Company* reports a net profit of 5,150,000 marks for the year 1927, as compared with 5,060,000 in 1926, the dividend being again at the rate of 8 per cent.

German Babcock & Wilcox Co.

This company reports a profit of £584,000 for the past year, and a dividend of 9 per cent. is being paid. All departments are stated to be fully occupied at present.

Stocks and Shares.

MONDAY EVENING.

BUSINESS during the past week can, perhaps, best be described as having been irregular. The Gilt-Edged Market was firm, helped by a strong Bank return, and the Home Railway Market was distinctly cheered by the Great Western dividend announcement, which was up to the highest expectations. On the other hand, the slump in rubber shares and, to a lesser degree, tin has resulted in a certain amount of forced selling of industrials, and this, added to a rather severe curtailment of carrying over facilities, has tended to cramp the style of the gambling fraternity, and has resulted in a certain amount of tenderness all round. As regards rubber, the market is largely of the opinion that prices now have dropped sufficiently for men with "wills of their own" (and, incidentally, bank balances of their own) to take up and put away rubber shares and convertible debentures, especially the latter.

Home Railways.

The Electric Railway Group has not been very much in the limelight, although both Metropolitans and Districts are better, particularly the latter at 70½. Undergrounds were rather inclined to be "sticky" round about 21s. 6d. c.d., and probably will not move much this side of the annual meeting. The 6 per cent. income bonds were dull in sympathy. The reports of the Underground Group, now to hand, show that Undergrounds in round figures earned about 7 per cent. for 1927, as against 5 per cent. actually payable. The dividends for 1927 of all the railways have now been announced, and it may be of interest to set them out, together with the rates for the previous two years, 1926, on account of the coal strike, being of little or no comparative value:—

	1927.	1926.	1925.
L.M.S. Ord.	4½%	3 %	6 %
South-Western Ord.	7 %	3 %	7 %
Southern Def.	2 %	1½%	3½%
L.N.E.R. Pref.	1%	1%	5 %
Metropolitan Railway Ord. ...	3 %	3 %	5 %
Metropolitan District Ord. ...	4 %	3½%	3½%
Underground Ord.	5 %	1½%	Nil

Electricity Supply.

Business in the Home Electricity Supply Section has not been so aggressive as it was last week, although the many rises then made have in every instance been kept, and in many cases added to. For instance, Metropolitans at 37s. 6d. have risen 2s. 6d. on the previous week's rise of 2s. At one time during the week they were 38s. bid. Electric Supply Corporations were also in active demand, with many shares changing hands. At 45s. bid they have added 1s. 9d. to their previous substantial rise of 5s. 9d. As the yield on both these shares at present prices is well under 5 per cent., it is obvious that purchasers are going for something more than the yield. The "something more," of course, is the possibility of being taken over á la Edmundsons'. Sevenoaks were good, marking around 25s., as were Chiswicks, on the basis of 54s. to 55s. Other bright spots were Isle of Thanet ordinary at 21s. and "E.D.Y.'s" (in other words, Electrical Distribution of Yorkshire) at 33s. 6d. The Oxford Electric Company is doubling its ordinary share capital, offering the new shares (one for one) to existing holders at 24s. At the same time, holders are receiving a bid of 2s. 6d. premium for these new shares from the Greater London and Counties Trust, Ltd. (of Edmundson fame). There is no attraction in this, however, as the shares are 3s. 6d. premium upwards on the Stock Exchange! A batch of dividends have made their appearance during the last few days: Westminster, Northampton, Clyde, Charing Cross and North Metropolitans—in every case the same as the previous year. Urbans have been in demand, and are in consequence 3s. 9d. up at 48s. 9d., showing a yield on last year's rate of distribution of 2½ per cent. Here, again, something more than the yield is apparently being gone for. Turning to the large bulk supply concerns, Newcastles have again been in active demand, the ordinary now being 24s. 9d. bid, with the new 24s. 6d. middle. The dividend here is due in a week or so, and is being looked forward to with a considerable amount of interest. The market hopes to see a return to the pre-strike rate of 7 per cent., as against 5 per cent. last year, and also looks forward to the possibilities of a new issue on bonus terms. Both Clyde Valley and Yorkshire Power have again appreciated at 34s. and 34s. 6d., respectively, and County of London ordinary at 32s. 6d. retained, but did not increase, their previous rise of 2s. 6d. There was a little more interest taken in North Wales Power ordinary, which hardened to 14s. 6d.

Overseas Electrics.

There has not been much of interest in the foreign and colonial section. Tokio Electric 6 per cent. debentures were on the dull side at 95. Atlas Light & Power were again in evidence, with the 7 per cent. preference a good market at

21s. 9d., the new, with part dividend, being 6d. under. The ordinaries at 20s. middle were unchanged. Mexican Light and Power common were active, rising to 65¼, with the 4 per cent. $5 second preference at 50s. The 7 per cent. preference were unchanged, and the first bonds were inclined to dullness, and reacted to 80. Electric Light and Power Cochabamba 6 per cent. debentures, which do not often come to market, were dealt in on the basis of 95-6. The directors of the Costa Rica Electric Light & Traction Co., Ltd., have received a bid of 65 per cent. for the 5 per cent. debentures and 1s. 9d. for the shares of that company, which they are advising share and debenture holders to accept. It cannot be said that the offer errs on the generous side, but on the whole acceptance seems to be the lesser of two evils, as those who decline the bid remain possessed of a hopelessly unmarketable security. Southern Brazil Electric 6½ per cent. debenture were in demand, and have risen to 74, and dealings have commenced in the 7 per cent. prior lien of this company, which has hitherto been held privately. The basis is 97.98.

Tramways.

The Tramway Market, like the curate's egg, was quite good in parts, some of the non-dividend payers (and there are many such in tramways!) being quite active. A good many shares changed hands in both Potteries Electric Traction 5 per cent. preference on the basis of 8s. 6d., and Lancashire United Transport and Power ordinary round about 9s. The report of the latter is to hand this morning, and is quite cheerful. Both the profits of the combined undertaking and the net profits of the holding company are the highest in the history of the company, being, in round figures, £74,000 and £53,000, as against £54,000 and £43,000 for the previous year. No ordinary dividend is again forthcoming, nor was it expected, the Board choosing, very wisely, to plough back the earnings into the motor-'bus part of the business. The market opinion is that this ordinary share round about the present price has distinct attractions from a lock-up point of view. The London Group are inclined to dullness, would-be buyers being inclined to hold off until after the annual meeting, which takes place some time in March. British Electric Traction issued are unchanged, the deferred being harder for choice. Brazilian Traction common were again better at 214¾. Monterey Railway Light and Power "A" and "B" have been in inquiry as a result of the offer circularised to stockholders, and commented upon in this column last week, and are now 57 and 13, respectively. Mexico Tramways common are 31, with the first and second bonds 83 and 75, respectively, all being on the quiet side. Barcelona Traction first bonds have been inquired for once or twice at round about 81. With the exception of a rise of a point in the preferred ordinary, British Columbia Electric Railway stocks were unchanged in price, albeit fairly active.

Telegraphs and Telephones.

Submarine Cables have been on the dull side, and what price changes there have been were mostly on the down grade. Eastern Extensions were dull at 140, as against 150 less than a month ago; both Anglo-American Telegraph preference and deferred were marked down, and Globe ordinary are no less than 25s. down at 14¾. On the other hand, United River Plate Telephones are ¾ to the good at 10⅛, and are being talked higher in certain quarters. Marconis moved within very narrow limits, and have been "bumping" up against the £3 mark all the week; until this evening, when they sagged rather badly to 56s. on forced selling by weak bulls unable to obtain contango facilities. Canadian Marconis recovered somewhat from their rather bad fall of the previous week, only to relapse again to 13s. 3d. Marconi Marines are 37s. 6d., and the 6 per cent. convertible debenture stock of the parent company has been a steady market round about 150.

Manufacturing.

Cheerfulness was again the predominating note in shares of the electrical manufacturing companies. The centre of interest has been Metropolitan-Vickers ordinary, which have been steadily bought all the week, to the accompaniment of rumours of some sort of a deal; either an amalgamation with the British Thomson-Houston Co. under the ægis of the International General Electric Company of America (which already controls the B.T.-H.) or, alternatively, a direct purchase. If these rumours turn out to be correct, this will be the second British electrical manufacturing concern to be absorbed by America within the last year or so, as it is pretty generally understood that the unknown purchasers of the Edison Swan ordinary shares hailed from that quarter. Metropolitan-Vickers were at one moment to-day 37s., from which they reacted very severely, closing at 34s. Siemens have been a strong market round about 32s., and Electric Constructions have been in inquiry, and are 1s. to the good at 26s. in consequence. General Electrics experienced a certain amount of end account selling, and were a little bit off the best at 36s., as were Brush at 29s. British Electric Transformer ordinary met with a little speculative inquiry on dividend hopes, and are now 17s. upwards. The Iron and Steel Group was definitely dull, especially the low-priced shares, which met with a fair amount of selling from tired holders. Such shares as Babcock & Wilcox, British Aluminium and Callenders, although unchanged in prices, showed little activity. Henleys have managed to retain their rise of the previous week.

Share List of Electrical Companies.

	Nom.	Dividend. 1925.	Dividend. 1926.	Price Feb. 20. 1928.	Rise or fall.	Yield. p.c.
HOME ELECTRICITY COMPANIES.						
Bournemouth and Poole	£1	14†	14†	64/-	—	4 7 6
Brompton Ordinary	£1	10	8⅝	25/-	—	5 12 0
Charing Cross Ordinary	£1	15	8½	26/6	—	5 5 8
do. do. 4½% Pref.	£1	4½	4½	17/6	—	5 2 10
Chelsea	£1	12	8⅝	26/-	—	5 7 8
City of London	£1	15	10	31/6	—	4 8 11
do. do. 6% Pref.	£1	6	6	23/-	—	5 4 4
Clyde Valley	£1	8	8	34/-	+6d.	4 14 2
County of London	£1	15	7½	32/6	—	4 7 0
do. do. 6% Pref.	£1	6	6	23/-	—	5 4 4
Edmundsons' Ordinary	£1	8	10	67/6	—	2 19 2
do. 7% Pref.	£1	7	7	25/6	—	5 9 10
Elec. Supply Corporation	£1	11	11	45/6	+1/9	4 17 9
Kensington Ordinary	£1	15	8	26/-	—	5 7 8
Lancs. Light and Power	£1	7½	7½	27/6	—	5 9 1
London Electric	£1	10	8½	25/6	—	5 9 10
do. do. 6% Pref.	£1	6	6	5½	—	5 8 2
Metropolitan	£1	11	8	37/6	+2/6	4 5 4
do. 4½% Pref.	£1	4½	4½	17/-	—	5 6 8
Midland Counties	£1	6	6	25/6	—	4 14 1
Newcastle-on-Tyne Ordinary	£1	7	5	25/-	+6d.	4 0 0
do. 5% Pref.	£1	5	5	18/-	—	5 10 0
do. 7% Pref.	£1	7	7	25/-	—	5 12 0
Notting Hill 6% Pref.	£10	6	6	10½	—	5 11 7
North Met. Elec. 6% Pref.	£1	6	6	23/-	—	5 4 4
St. James' and Pall Mall	£5	17½	8	27/-	—	5 3 8
South London	£1	15	8½	25/6	—	5 9 10
South Metropolitan Pref.	£1	7	7	1¼	—	6 8 0
Urban Ordinary	£1	7	7	48/9	+3/9	2 17 5
do. 6% Pref.	£1	6	6	1⅛	—	5 13 0
Westminster Ordinary	£1	15	8½	26/-	—	5 7 8
Whitehall Elec. Invst. 7½% Pref.	£1	7½	7½	21/10½	+1½d.	6 17 0
Yorkshire Elec.	£1	8	8	34/6	+1/-	4 12 9
HOME RAILS.						
Central London Ord. Assented	Stock	4	4	75	+1	5 6 8
Metropolitan	,,	5	3	68	—1	4 8 3
do. District	,,	3½	3½	70½	+2½	5 13 6
Underground Electric	£1	Nil	1½	21/6	—	4 13 0
do. do. Income	Bonds	6	6	108	—1	5 11 1
TELEGRAPHS AND TELEPHONES.						
Anglo-Am. Tel. Pref.	Stock	6	6	94½	—3½	6 7 0
do Def.	,,	1½	1½	23	—½	6 7 8
Automatic Telephone	£1	3	10	48/9	—	4 2 4
Chili Telephone	£5	5	6	7⅞	—	3 18 3
Eastern Extension	£10	10	10	15	—	*6 13 4
Eastern Tel. Ord.	Stock	10	10	140	—5	*7 2 10
Globe Tel. and T. Ord.	£10	10	10	14¾	—1¼	*4 15 7
do. do. Pref.	£10	6	6	10½	—½	5 17 1
Great Northern Tel.	£10	20	20	39	—	5 2 7
Indo-European	£5	8½	10	35	—	*6 1 5
Marconi	10/-	Nil	5	57/-	—3/-	1 15 0
Marconi-Marine	£1	7½	8¾	37/6	—1/3	4 13 4
Oriental Telephone Ord.	£1	12	12	51/3	—	*4 13 6
United R. Plate Tel.	£5	8	8	10⅜	+⅜	*3 15 3
Western Telegraph	£10	10	10	14	—	*7 2 10
HOME AND FOREIGN TRAMS, &c.						
Anglo-Arg. Trams First Pref.	£5	5½	5½	3⅞	—	7 6 8
do. do. 2nd Pref.	£5	6	6	3⅝	+1/16	7 14 10
do. do. 5% Deb.	Stock	5	5	80	—	6 5 0
British Electric Traction Def. Ord.	,,	—	—	510	—	... ...
do. do. 8% Pref. Ord.	,,	7	8	124½	—	6 8 6
Brazil Traction	£100	5	6	214½	+1½	2 15 11
Brit. Columbia Elec. Rly. Pce.	Stock	5	5	93½	—	5 6 11
do. do. Preferred	,,	6¼	6¼	160½	+1	*3 17 11
do. do. Deferred	,,	8	8	202½	—	*3 19 0
do. do. Deb.	,,	4¼	4¼	84½	—	5 0 7
London & Sub. Trac. 5% Pref.	£1	Nil	Nil	8/-	—	... ...
London United Tram Deb.	Stock	4	4	55½	—	7 4 2
Mexico Trams, 5% Bonds	—	5	5	83	—	6 3 4
Mexican Light Common	£100	Nil	Nil	65½	+4½	... ...
do. 7% Pref.	£100	Nil	Nil	78	—	... ...
do. 1st Bonds	—	5	5	80	—1½	6 8 0
Yorkshire (West Riding)	£1	5	—	7/6	—	... ...
MANUFACTURING COMPANIES.						
Babcock & Wilcox	£1	13	13	64/3	—	4 1 3
British Aluminium Ord.	£1	12½	10	50/-	—	4 0 0
British Elec. Transformer Pref.	£1	7	7	18/3	—	7 13 6
British Insulated Ord.	£1	15	15	4 8	—	3 13 9
Brush Ord.	£1	10	10	29/-	—1/-	6 17 11
Callenders	£1	15	15	3⅛	—	3 16 4
do. 6½% Pref.	£1	6½	6½	23/-	—	5 9 5
Crompton Parkinson Pref. Ord.	£1	—	—	17/6	—	... ...
Edison-Swan	£1/-	10	10	10/-	—	4 0 0
do. 5% Deb.	Stock	5	5	90	—	5 11 0
Electric Construction	£1	10	7½	26/-	+1/-	5 15 5
Enfield Cable Pref.	£1	7½	7½	26/3	—	5 14 3
English Electric	£1	Nil	Nil	9/6	—	... ...
do. do. Pref.	£1	6	8	12/6	—	... ...
Gen. Elec. Pref.	£1	6½	6½	24/-	—	5 8 4
do. Ord.	£1	7½	7½	36/-	—6d.	4 3 4
Henley	£1	20	25	5½	—	4 10 11
do. 4½% Pref.	£5	4½	4½	4½	—	5 6 0
India-Rubber	£1	5	Nil	12/6	—1/3	... ...
Johnson & Phillips	£1	17½	12½	53/9	—	4 12 7
Met.-Vickers Ord.	£1	8	8	34/-	+2/-	4 14 2
do. Pref.	£2	8	8	2⅜	—	6 1 11
Siemens Ord.	£1	7	7½	31/6	+1/-	4 15 3
Telegraph Construction	£12	10	10	25½	—	*4 14 1

* Dividends paid free of Income Tax.
† 4% of which was Tax Free.

Our Foreign Electrical Trade.

Electrical Exports and Imports during January, 1928.

THE statistics of our electrical exports and imports during last month, which are reproduced below, do not at first sight disclose an encouraging tendency. Although the exports were higher than in December, in the comparison with the corresponding month of 1927, they fell by £163,567. Upon examination, however, it is found that submarine telegraph and telephone cable is again responsible for the decrease.

Comparing the figures with those for January, it will be seen that the increases predominated, and that the most important rises were in the machinery and telegraph and telephone sections. All three items of the former class registered gains, and the aggregate increase over December was £112,832. The increased exports of submarine and non-submarine telegraph and telephone wires and cables were about balanced by the fall in the value of apparatus exports. Unenumerated goods and apparatus showed the largest actual decline (£33,862), and glow lamps the greatest proportional fall. It is interesting to note that at the same time the imports of lamps were much higher. In the comparison with January, 1927, increases and decreases were equal in number, and apart from the before-mentioned submarine cable item, were also about balanced in value, A decrease of £57,707 in railway and tramway motors was only partly met by the rises in the other two machinery items. Unenumerated goods and apparatus and insulated wires and cables fell considerably in value, but there was a substantial rise in non-submarine telegraph and telephone wires and cables.

There was a small decline in the import total as compared with December, the principal contributors to the fall being batteries and accumulators. The rise in the glow lamp imports has already been mentioned. The other variations in this section were not of large proportions, and increases and decreases were about balanced. In comparison with January, 1927, there was a fairly large rise which was contributed to by all classes except arc lamps and switchboards. The two unenumerated classes were together responsible for a third of the increase, but glow lamps more than doubled, rising by £44,767.

The re-export section recorded a substantial fall as compared with December, but the total was £3,834 above that of January, 1927. The decrease was fairly general, but declines in the two unenumerated classes were prominent.

The distribution of our exports of electrical machinery is shown in the following table, and the figures for January, 1927, are given for comparative purposes:—

Destination.	Jan., 1927. £	Jan., 1928. £	Inc. or dec. £
European countries ...	71,691	124,259	+ 52,568
Japan	36,293	11,704	− 24,589
South America ...	31,147	101,593	+ 70,446
South Africa	148,393	37,743	−110,650
British India	126,451	94,235	− 32,216
Australia	66,667	80,144	+ 13,477
New Zealand	52,603	41,265	− 11,338
Canada	17,510	20,475	+ 2,965
Other countries ...	62,568	89,662	+ 27,094
Totals ...	£613,323	£601,080	−£12,243

	Exports. Electrical exports for Jan., 1928.	Inc. or dec. as compared with Dec., 1927.	Inc. or dec. as compared with Jan., 1927.	Imports. Electrical imports for Jan., 1928.	Inc. or dec. as compared with Dec., 1927.	Inc. or dec. as compared with Jan., 1927.	Re-Exports. Electrical re-exports for Jan., 1928.	Inc. or dec. as compared with Dec., 1927.	Inc. or dec. as compared with Jan., 1927.
Electrical goods and apparatus (unenumerated)	£162,406	−£33,862	− £25,069	£128,977	+ £4,630	+ £13,735	£5,744	−£2 519	− £223
Insulated wires and cables ...	244,513	+ 6,517	− 30,062	62,590	− 5,781	+ 1,702	1,784	− 55	+ 77
Glow lamps	43,027	− 10,992	− 70	80,698	+ 22,812	+ 44,767	1,063	− 64	+ 116
Arc lamps and parts ...	1,523	+ 325	+ 76	592	− 3,768	− 1,374	8	− 384	− 4
Batteries and accumulators ...	87,742	− 1,857	− 639	48,549	− 31,388	+ 1,450	315	− 1,299	− 45
Meters and instruments ...	31,588	− 1,900	− 121	27,171	− 1,965	+ 5,073	886	+ 404	+ 288
Carbons	2,852	+ 2,205	+ 1,813	10,893	+ 1,460	+ 4,076	51	− 16	− 3
Switchboards (not telegraph or telephone)	11,765	+ 3,911	+ 7,410	—	− 72	− 567	—	—	—
Electrical Machinery –									
Electrical machinery (unenumerated)	333,049	+ 49,939	+ 28,193	148,096	+ 1,196	+ 17,952	8,555	− 6,312	+ 1,966
Railway and tramway motors	42,120	+ 34,020	− 57,707	—	—	—	—	—	—
Other motors and generators...	225,911	+ 28,873	+ 17,271	—	—	—	—	—	—
Telegraph and Telephone Cable and Material—									
Telegraph and telephone wires and cable (not submarine)	101,169	+ 31,399	+ 47,611	11,834	+ 126	+ 2,107	179	− 83	+ 139
Submarine telegraph and telephone cable...	43,680	+ 25,703	− 159,806	—	—	—	—	—	—
Telegraph and telephone instruments and apparatus ...	215,344	− 59,389	+ 7,533	53,354	− 6,621	+ 5,733	4,003	+ 1,938	+ 1,523
Totals	£1,546,691	+ £74 892	−£163 567	£572,754	− £19 371	+ £94,654	£22 588	−£8,420	+£3,834

Electrical "Trusts" in America.

The Federal Trade Commission of the United States has recently directed its attention to the electrical industries of that country. An investigation of the operations of the large manufacturing companies has been undertaken, and we hope to deal with the resultant report in a later issue.

The alleged existence of a "power trust" is now engaging its energies. The Progressive Party has stated that the whole of the production and distribution of electricity and gas in the United States is controlled by Wall Street to the disadvantage of the consumer.

German Plant for Russia.

The Soviet Government has placed orders in Germany for the construction of equipment for two works for the production of concrete parts necessary in connection with the building of the Dniepr hydro-electric station. The orders were placed with Krupps, who are to supply all the necessary machinery, except the electric motors and other electrical appliances. In view of the credit facilities which are at present accorded by Austria for Soviet orders, a number of orders for the Dniepr station will be placed in Vienna. The foundation stone of the station was laid in November and it is said that the station will be the largest in Europe.

The British Industries Fair.—II.

The President of the Birmingham Chamber of Commerce upon the necessity for continued assistance from the Government. The Mansion House Dinner. Further exhibits by electrical manufacturers described.

VISITORS to this year's Fair at Birmingham are unanimously agreed that the arrangements are a great advance upon previous efforts, and indicate a great deal of hard work and thorough organisation upon the part of the Birmingham Chamber of Commerce and its very able officials. The same may be said of the London Section, for which the Department of Overseas Trade is responsible. The number of exhibitors at the White City exceeds the number at Birmingham, but the stands are generally smaller in consonance with the nature of the exhibits. The Wireless Section at the White City is the largest ever included in the Fair; it is representative, and illustrates very forcibly the capabilities of British manufacturers in this important direction.

There was a large attendance at a private view of the Birmingham section on Friday last, the technical, trade and general Press being well represented.

The total number of exhibitors, on 700 stands, is 900, and it is to be noted that the exhibits are better arranged and more concentrated in their respective groups than in previous years, so that buyers experience no difficulty in finding the goods which interest them. The schedule contains the following groups of industries:—Brassfoundry, hardware and ironmongery, 228 exhibitors; metals, 42; construction, building and decoration, 82; power, lighting, heating, cooking and ventilating, 204; engineering, 210; agriculture, 52; motors, motor-cycles and cycles and accessories, 13; guns, saddlery and harness, 6; services, 63.

The products of the electrical manufacturers (in the group devoted to power, lighting, heating, cooking and ventilating) make an excellent show. The industry is represented in the many phases of its diverse activities by leading manufacturers, and on their stands are to be seen, often under working conditions, examples of the latest appliances for use in the modern factory, public building, shop and home. There are many special features, and evidence is not wanting of increased attention to the standardisation of output. The electrical manufacturers' enterprise has evidently aroused the gas industry; for the first time there is a concentrated exhibition of gas equipment, and it is more representative of the gas industry than previously.

Luncheon at Birmingham.

Mr. G. N. Guest (President of the Birmingham Chamber of Commerce) presided at a luncheon on Friday which was attended by many members of the Council of the Chamber, and the Fair Management Committee, of which Col. H. J. Walduck is chairman. Those present included Mr. H. H. Berry, chairman of the Electrical Advisory Committee, Mr. Thomas R. Martin (J. H. Tucker & Co., Ltd.), last year's chairman of the Fair Management Committee, and Mr. E. J. Jennings (Birmingham Electric Supply Department).

In a brief statement, Mr. Guest said the progress made by the heavy section of the British Industries Fair was a matter for great satisfaction. It had had its vicissitudes, but all the indications now pointed to continued development. The Government had agreed to spend a sum not exceeding £25,000 for the purpose of publicity for this year's Fair both at home and abroad. That publicity covered the sections at London and Birmingham: but the Fair Management Committee had heard with regret and astonishment that the Government did not propose to spend any further money in that direction. Mr. Guest said that that must not be; more money not less was needed. The Fairs were doing a splendid service in the rehabilitation of national trade, and the movement was entitled to all the practical assistance which the State could give to it. He added that the Birmingham Chamber of Commerce had undertaken the financial responsibility of running the Fair. It had "stood the racket," and was entitled to all official encouragement. Many months before the Fair was opened, steps were taken to ensure that the whole of the interested world was advised about it, the aim of the Fair authorities being to secure the attendance of interested buyers from all markets, and to enable them to see displayed in a commercial way the best that the factories of the country could produce. The object of the Fair was to provide a real opportunity for seller and buyer to meet face to face, for personal contact was the most important factor in the promotion of trade. The British Industries Fair had a dual advantage. It enabled manufacturers, as sellers, to meet a large number of buyers and to show them their samples within a comparatively short period of time. For the manufacturer to visit directly all such buyers would occupy a very long time, even if they were all established in various parts of this country. The buyer, on the other hand, had the opportunity during the Fair to see displayed side by side the competitive products of a number of manufacturers and to discuss terms with one and all of them under excellent conditions. In conclusion, he said that the demand which they at Birmingham could already foresee for space in 1929 convinced them still further extensions would be required.

One indication that the electrical section of the Birmingham Fair has aroused the interest of the authorities, is the appearance of a whole page dealing with it in a supplement to last week's *Board of Trade Journal*. Special mention is made of the supply arrangements on the Birmingham Corporation stand, and a number of new features which can be seen are touched upon. Directions in which British productions offer a direct challenge to foreign makers are stated.

The Mansion House Dinner.

The London Section was visited by the Duke and Duchess of York on Monday last and in the evening the Duke attended the Government dinner at the Mansion House. Sir Philip Cunliffe-Lister (President of the Board of Trade) presided, supported by Ministers and distinguished Dominion and foreign representatives.

In proposing the toast of "The British Industries Fair," His Royal Highness said that he had been struck by the marvellous growth of the Fair. It was worth the while of any business man to pay a visit. He thought that the Fair was being held at an auspicious moment, for in many directions trade was distinctly improving. Britain had not lost ground during the time of depression; the volume of British manufactures sold in the world's markets was higher than that of any other country. He hoped that the Fair would go from strength to strength, bringing in its train a constant increase in the volume of business.

Sir Philip Cunliffe-Lister, responding, said that buyers from 70 countries were coming to the Fair. He was certain that they would not be disappointed. They would find that British quality was as good as ever, and with quality and novelty there was consistency of delivery of goods always equal to sample. Sir Stanley Machin and Mr. G. N. Guest also replied to the toast. Sir Austen Chamberlain proposed the health of the guests. He drew attention to the fact that all the Government had contributed to the Fair was "a wretched £25,000 a year for publicity." It had to be said, however, that the services of admirable officials had been made available. The toast was replied to by the Spanish Ambassador and the High Commissioner for Australia.

Some of the Exhibits.

Details and Illustrations.

General Electric Co., Ltd.

The company's twenty British factories are represented upon this stand. The Witton group of factories is represented, but as these works are near the Fair visitors are able to gain a better idea of their scope by an actual inspection. The Witton display comprises three principal exhibits: a 60-h.p. "Witton" synchronous induction motor; a 2-motor all-electric traction control equipment in operation and a 240-h.p. railway motor; and a 10-h.p. high-torque squirrel-cage "Witton" motor with contactor type star-delta starter operated by push-button control.

The all-electric two-motor traction control equipment with a 240-h.p. motor (fig. 5) is exactly as supplied to the London Electric Railway. The G.E.C. has recently received its fifth important contract from the L.E.R., covering control equipment for 63 motor coaches, 107 trailer coaches, and 920 motors.

The high starting torque squirrel-cage "Witton" motor referred to above is also shown in operation. Owing to the fact that the increased capacity of modern power stations has led to supply authorities allowing larger starting currents to be taken by motors than heretofore, the G.E.C. has developed the high torque motor, which by virtue of its characteristics can be installed in many instances where a slip-ring machine would previously have been necessary. The starting and control equipment comprises a contactor panel surmounted by a triple-pole isolating switch. The panel consists of a slate slab mounted in a steel-plate case, which has a glazed cast-iron door at the front.

It is equipped with a triple-pole "delta" contactor, a double-pole "star" contactor, and a timing relay. The contactors are mechanically and electrically interlocked, and a small protective fuse is provided for the operating coil circuits. Three time-limit overload relays are also provided.

The Pirelli-General Cable Works are represented in a somewhat different way from the factories of Witton. No attempt is made to stage a complete range of the various classes of cables made, but a number are exhibited. The outstanding feature of this section consists of models of h.p. transmission lines representing the poles and insulators that have been standardised by the Central Electricity Board for the English schemes. These three models show the structural design of

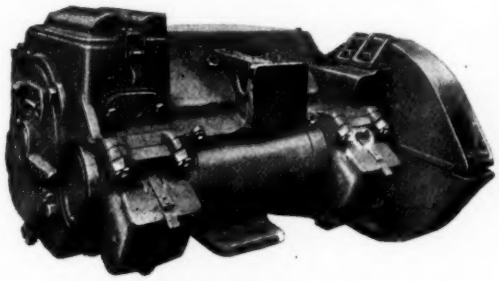


Fig. 5.—A G.E.C. 240-h.p. Traction Motor.

the towers, their spacious lattice-work suggesting considerable mechanical strength, while the method of suspending the conductors has unusual interest.

The exhibit of the Fraser and Chalmers Engineering Works includes a model of a pulverised fuel plant consisting of an "F. & C." impact pulveriser connected to a Lancashire boiler. The pulveriser is one of the makers' latest designs, and embraces some new and interesting features, among which are: The ease of control of the pulverised fuel, low power consumption, efficient pulverisation, and compactness of design. The body of the pulveriser is made in halves, thereby ensuring easy inspection. The burner, of the "Virtex" type, has been specially developed for application to Lancashire boilers, and is the result of many years' experiment and research. This burner makes for most efficient operating, and ensures complete combustion within a few feet of the boiler front. The Lancashire boiler is shown in section only, although a graphic idea of the combustion of the fuel is obtainable from an electrically-illuminated sign installed on the stand. A full size wooden model of a section of the cylinder of the Fraser and Chalmers heavy-oil engine is shown on the stand. This illustrates the arrangement for completely cooling the cylinder liners from top to bottom, and for ensuring a rapid flow of water around the top or bottom part of the cylinder liners. Other important features, such as the provision for heat transfer and low heat stress, and the arrangement of the gas joint directly above the supporting shoulder are also observable. The exhibit includes component parts of Fraser and Chalmers turbines and turbo-compressors.

Examples of "Magnet" heavy electric cooking equipment are exhibited. These include a double range, a pastry oven, and a griller. Special features of the design are mechanical strength, standardisation of component parts, and ease of replacement of the elements.

The Birmingham Heating and Cooking Apparatus Works are also represented by a range of electric household appliances, including kettles, toasters, irons, fires, cooking plates, &c.

The Wireless Apparatus Works, Stoke, near Coventry, contributes a display of "Gecophone" radio sets and components. In this connection "Osram" valves will represent the G.E.C.-Osram Lamp Works, in addition to a range of "Osram" lamps.

Credenda Conduits Co., Ltd.

On this stand is a very representative selection of apparatus bearing the "Creda" trade name. Prominence is given to some new electric storage heaters made in four standard sizes (1¾, 5, 10, and 22 gallons). These heaters are automatic in operation and provide a constant supply of very hot water; they require no attention, a thermostat switching on and off current as necessary. One of the 1¾ gallon size cylinders, which are highly finished on the outside in white cellulose enamel, and lined in scarlet and gold, is shown in fig. 6. A full range of "Creda" cookers is also shown; eight different

Fig. 6.—A new "Creda" Water Heater.

Fig. 7.—A "Creda" Cooker.

models are made, and one of these is illustrated in fig. 7. Electric kettles, irons and fires are also displayed on the stand. Another interesting section of the exhibit is a selection of new "Credalux" reflector lighting fittings.

In the centre of the stand is a demonstration room in which lighting fittings, fires and water heaters can be seen. Samples are also shown of Credenda conduits and conduit fittings, made at the Star Works, Aston, Birmingham.

Chloride Electrical Storage Co., Ltd.

This company exhibits "Chloride Plante" and "Chloride Rosette" type plates in a very large range of sizes—the individual positive plates ranging from 10 Ah capacity to 450 Ah. Photographs of batteries constructed with these plates to a capacity of over 10,000 Ah are displayed. A selection of different types of batteries for house lighting appears; this comprises both the open cell, and the fully charged, sealed-in cell, which has now become the standard design adopted by the chief lighting set manufacturers in this country. These cells range from 180 Ah capacity down to 20 Ah, and are of robust construction. A complete battery, suitable for house lighting purposes, takes a prominent position in the display, and comprises a 14 SFG4 cell battery arranged on double tier stillage, capacity 200 Ah at the 10-hour rate. Specially designed types for radio work, including the latest developments in high-tension batteries, are shown. In this class attention may be drawn to the new WH 10-V wireless battery with a capacity of 5,000 milli-amp. hours assembled in a multi-compartment glass box. These batteries are also shown in 40-V and 60-V assemblies in polished wood crates. The usual range of low-tension wireless

batteries in celluloid boxes is on view, together with several in glass cases. These "mass" type cells are extensively used for operating electric bells, telephones, &c. A new range of unspillable batteries in celluloid boxes for portable sets and a selection of batteries suitable for medical purposes are exhibited. Higher capacity batteries are available for inspection, and types for marine wireless installations and lifeboat sets, together with others designed for emergency lighting and gyro-compass operation. "Exide-Ironclad" batteries for traction purposes are included and cut-away sections showing details of the slotted tube construction of these cells are available. This type of cell has been specially designed for use on locomotives, and all forms of transport using battery power. Specimens of the "Lux" battery, specially designed for train lighting, and special cells for miners' handlamps and portable batteries, are also displayed.

Callender's Cable and Construction Co., Ltd.

Callender's display every description of rubber-insulated cable, including motor-car flexibles, lighting and ignition wires, workshop flex, cables for ship and colliery work, and patent cab-tire-sheathed cables. They are also showing many types of paper-insulated cables, for working pressures from 220 to 132,000 V. In conjunction with these cables, various types of joint boxes are shown, a particular point of interest being a straight joint for 132,000 V. Other exhibits in this section include an all-steel transformer kiosk, network boxes, straight joint boxes, including chill cast lead sleeves, and house service fuse boxes, as well as various mouldings of "Kalanite," Callender's non-hygroscopic insulating material. Overhead transmission line equipment is given a good show, including the well-known "Callender-Kay" tripod poles. One of the most popular exhibits on the stand is the Callender wiring system, which consists of rubber-insulated metal-sheathed wire, simple but strong junction boxes, and few accessories. A most interesting departure is the actual demonstration of the "Callender-Wilson" automatic plumber (fig. 8). In this illustration, 1 is the blow lamp, bracket and shroud with the heating element; 2, the assembly of the foregoing; 3, a galvanised-iron "hold-all"; 4, brass glands with plumb; 5, drawing-up bolts for the brass gland; 6, a tool tray; 7, heating dies; 8, lead cones; and 9, drawing-up clamps. It is shown how it is possible to effect the jointing of paper-insulated lead-sheathed cable, even in fiery mines, with perfect safety. The apparatus consists of pre-cast lead cones which are plumbed to the lead of the cable by means of copper heater blocks and electrical elements. This apparatus can also be supplied for ordinary use by a method employing a standard blow-lamp, and the simplicity of the operation is noteworthy.

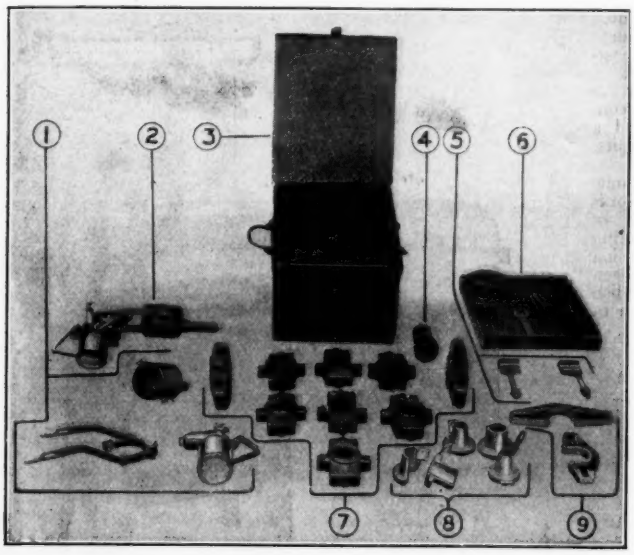


Fig. 8.—The Callender-Wilson Automatic Plumber.

British Thomson-Houston Co., Ltd.

Electrical plant for industrial use figures most prominently on this stand. In the most recently introduced range of motors the company offers a.c. and d.c. machines of the same ratings, which are identical in all essential dimensions. The motors in this range are of both the horizontal and vertical type and can be supplied to run at any angle, and are arranged to enable machine makers to fit their own adaptor rings or adapt the motors to pumps, &c. The company's fractional h.p. motors are represented by typical examples from the standard range for fixing in the ordinary manner, and by examples of a modified design, without feet, for special application. The company manufactures electric motors of every size, and claims that the largest motor in the world is a 20,000-h.p. B.T.-H. motor driving a Yorkshire steel mill.

The motor control gear exhibited comprises numerous types for both a.c. and d.c. motors. The equipments exhibited cover the requirements of all sizes of electric motors from 15 h.p. to 100 h.p., with and without speed control, but the complete ranges manufactured by the company are for motors from the smallest to the largest output. An interesting equipment recently introduced is the "Type ATM Form S," for non-reversing slip-ring motors up to 30 h.p. at 600 V (fig. 9). The equipment is so connected that the motor can be stopped from a distance by push button control. The pressed sheet steel case houses a drum-type starting switch, a contactor-type circuit breaker provided with under-voltage release and opening all three phases of the stator circuit, a "dead-man's" handle and a thermal over-current relay in each phase. The type of circuit-breaker employed is particularly suitable for hard wear and after removal of an overload it is only necessary to bring the starting switch to the "off" position and re-start the motor. To stop the motor, the starting handle is returned to the "off" position; but by means of an interlock the operating coil circuit of the contactor circuit breaker is interrupted and the breaker opens immediately the starter leaves the "running" position, thereby cutting off the power supply. "Inching" can be effected by alternately depressing and releasing the "dead man's handle" when the starting switch is in the "start" position, or the operation can be carried out by means of push buttons. One of the new B.T.-H. industrial controllers for crane and steel works service is also included in the control gear exhibits. Another new item is an ironclad oil-immersed triple-pole thermal circuit breaker (Type JA1) with "on" and "off" push button control. This type of circuit breaker is primarily intended for use with three-phase induction motors, on circuits up to 660 volts. A momentary starting current of five or six times the normal current is safely carried without the breaker tripping, but no overload can persist for a sufficiently long time to cause injury to the motor insulation by overheating. In this equipment remarkable compactness has been obtained. Control of the breaker is effected by "on" and "off" push button switches with spring release, the switches being situated on the breaker base and the push buttons mounted either on the breaker case or fitted at any number of distant points. They can also be incorporated in the rotor starter so that the breaker is closed automatically when the first contact is made on the starter. Standard sizes of breaker at present are for 30, 60, and 100 A. A further new development is an ironclad oil-immersed double-break circuit breaker (Type OZ) for three-phase circuits up to 660 volts. Like the thermal circuit breaker, it can be arranged for mounting on a machine or wall, or supplied on a pedestal framework. It can be provided with a mechanically interlocked isolator, two or three over-current series trips, with or without fixed or adjustable time lags, and an under-voltage release which can be electrically interlocked with a motor starter. Various types of industrial and office lighting fittings are effectively displayed, as are "Fabroil" silent pinions, electrical domestic apparatus, "Tungar" rectifiers, B.T.-H. radio valves and radio apparatus, while there is an attractive display lighting scheme carried out with "Pearl Mazda" lamps.

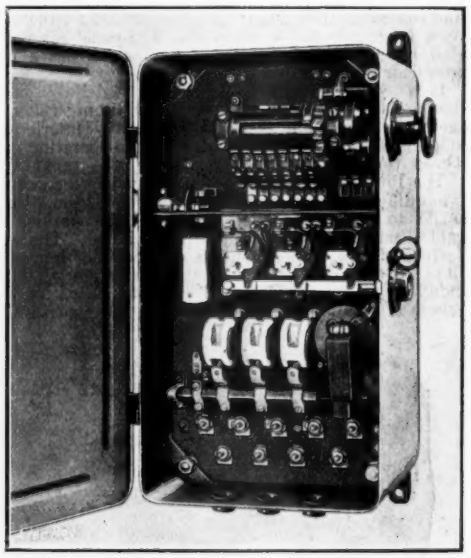


Fig. 9.—A B.T.-H. Controller for a Slip-ring Motor.

Hart Accumulator Co., Ltd.

The Hart Company is represented at both sections of the Fair. The Birmingham display includes many examples of low-tension radio batteries in specially moulded pressed glass boxes. Fitted internally with moulded ribs or grooves, extending almost to the bottom of the box, the use of bottom blocks is entirely obviated, and, in consequence, a larger space is available for the collection of any deposit, and for a greater volume of electrolyte. The "RME" type shown is intended,

primarily, for operation with valves requiring considerable current. Other samples of low-tension accumulators shown are the "ME" type, in celluloid; the "MEU" type, which is fitted with a special device for obviating any splashing or spilling of acid from the cell; and the "MEZ" type, which, assembled in an ebonite container, is suitable for use in tropical climates, or similar conditions. For high-tension radio use the "RAO" type, having a capacity of 1,250-2,500 milli-ampere hours, is exhibited. The container consists of a moulded glass box, which is provided with grooved bottom rests into which the plates fit. The lid is of ebonite, sealed to the cell with a special compound, and, when assembled into batteries, the cells are connected to each other by means of connectors made from an alloy of non-corrodible metal. Both the positive and negative plates are covered with sheets of perforated ebonite which completely envelop them, thus preventing any dislodging of the active material from the grid structures. The circular glass boxes, into which these cells are fitted, are provided externally with a projecting rib which holds them in position upon a perforated tray. In the same class there is the "Raydax" accumulator, which, similar in design to the "RAO," but, having a capacity of 3,000-6,000 milli-ampere hours, is useful to users of sets incorporating heavy-consumption power valves. The "Ray" (1250-2,500 milli-ampere hour) and "Rado" (3,000-6,000 milli-ampere hour) types of high-tension accumulators, samples of which are exhibited, have been evolved, primarily, to meet the requirements of wireless users to whom economy in space is of importance. Manufactured in 20- and 30-volt units, as standard, the wooden frames into which these cells are assembled are so arranged as to permit of their being placed, if desired, one on top of the other. To meet the demand for high-tension accumulators in moulded compartment glass boxes, the company displays the "Comparto" type, having a capacity of 1,500-3,000 milli-ampere hours, and the "Sturdo" type, with a capacity of 3,000-6,000 milli-ampere hours, assembled respectively in 12-V and 10-V groups. Other exhibits of the company include storage batteries suitable for private house electric lighting installations, central station work, yacht lighting, &c.

Heyes & Co., Ltd.

The exhibits of this company include a range of "Wigan" ironclad switchgear, lamp fittings, prismatic fittings, mine-signalling equipment, telephones, &c. The 100-W prismatic lamp fitting illustrated in fig. 10 is one exhibit. In this the even distribution of the light is ensured by the use of a concave mirror, and it is also fitted with a ventilating device to allow of the dispersion of the heat which is generated by gasfilled lamps. Another device shown is the "Wigan" trans-

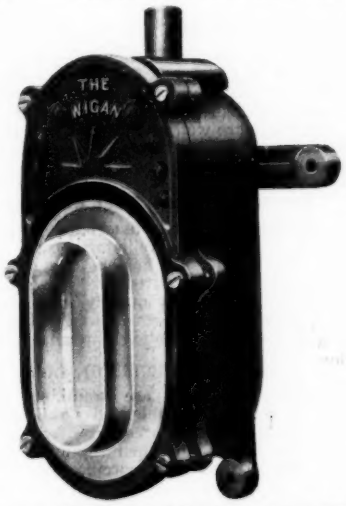


Fig. 10.—A "Wigan" Prismatic Lamp Fitting.

former switch plug, which has been designed to eliminate the various risks which are entailed by the use of portable hand-lamps, &c. By means of the voltage reduction effected the resultant low pressure on the removable plug eliminates the risk of shock. The primary circuit is protected by double-pole fuses, and is controlled by a double-pole quick-make-and-break switch, the latter being actuated by the removable plug.

Davey, Paxman & Co., Ltd.

On this stand are displayed two vertical crude-oil engines, the smaller size being of 25-29 b.h.p., single cylinder, and the larger of 360-420 b.h.p., six cylinder. Both engines are built on the well-known Paxman principle of unit cylinders and ventilated crank-cases. The injection of the fuel is on the "spring injection" system, and the design of both engines embodies the "Paxman-Lentz" type of valve gear. Demonstrations of stopping and starting are given to show the simplicity of these operations, and attention is drawn to the fact that the engines are shown running under their own power on their ordinary fuel. The larger engine is provided with a platform, to enable visitors to walk all round and examine the engine in motion. Separate parts of the engine are also exhibited, including a sectional head completely fitted up with valves and camshaft which can be operated by hand to demonstrate its working.

M-L Magneto Syndicate, Ltd.

On this stand are examples of the company's permanent-magnet machines. The entire absence of field windings reduces the possibility of breakdown, and, it is claimed, makes the machine much more efficient. The use of a permanent field also permits a more compact design than that of the usual wound field machine. The machines are supplied for a number of purposes, such as small power motors and generators, battery chargers, electrically-operated tachometers, and the supply of power for wireless and similar purposes. Types "E" and "F" have been designed to meet the demand for a unit which will supply a considerable plate current at a fairly high voltage. They may be wound as rotary transformers, or as single- or double-current generators. Smoothing circuits are shown which ensure a rippleless supply reaching the valve anodes. Fig. 11 shows a motor-driven generator for providing h.t. and l.t. supplies. Motor-generator sets embodying these machines are shown. Complete h.t. and l.t. smoothing circuits are provided, and also an automatic

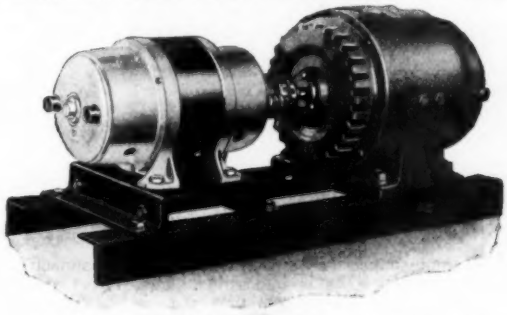


Fig. 11.—Motor-driven Double-current Generator.

cut-out which disconnects the generator from the l.t. smoothing battery when the motor is stationary. The "M-L" anode convertors are again shown in much improved form. The company makes self-contained lighting units in which current is furnished by a generator driven by a small compressed air turbine. Several sizes and types of these lamps are manufactured for various purposes. The high-power safety lamp shown for use in mines consists of a small radial flow impulse turbine directly connected to a revolving field alternator, with a cobalt steel magnet giving approximately 60 W at 25 V. There are, of course, no rubbing contacts, and the whole of the casing, containing turbine, generator, and lamp, is maintained under a slight air pressure of 2 to 3 lb. per square inch, by means of a spring-loaded exhaust valve, thus preventing any possibility of infiltration of fire damp. An automatic device is incorporated in the lamp, which immediately cuts off the current in case of damage to, or interference with, the protecting glass over the bulb. The exhibit also includes a selection of synthetic-resin mouldings.

W. Canning & Co., Ltd.

The warm nickel-plating apparatus shown by this company can be fitted to any existing plating vat. The apparatus, which is shown in action, consists of a rotary pump of special design, agitating and filtering coils in the vat, together with the filter head and bag, a method of warming the solution and a very simple arrangement for moving the cathodes. Chromium plating apparatus is also on view and should prove of great interest in view of the attention which this subject is receiving at the present time. The company has installed over 40 plants for chromium deposition, both for producing a bright decorative finish, and also the heavy dull coatings suitable for protecting tools, gauges, &c. A further innovation is the "Otter" dryer, which eliminates the use of sawdust in the plating and dipping shops; it is designed for drying-out small parts after barrel-burnishing or barrel-plating or dipping, and is automatic in action. Barrels for electro-plating, low-voltage dynamos, motor generators, resistances, and other plating accessories are also exhibited.

Siluminite Insulator Co., Ltd.

On this stand there are a number of switchboard panels in various grades of materials. The company is showing for the first time stove-enamelled switchboard panels in moulded materials which are fireproof and of good dielectric strength. Three grades of "Siluminite" are shown in the form of switchboard panels, rods, sections, track insulators, rail covers, &c. "Fibrestos" is shown in the form of sheet for the lining of h.p. cubicles, arc shields, &c., where the surroundings are not damp. Another material exhibited is "Arcovite" in the form of arc shields, core-plate reflectors, and the like. Two grades of "Ebbinite" are on view: No. 1 for cheap moudings where temperature does not enter into consideration, and No. 2 where high dielectric strength combined with great mechanical strength is required. This material is shown in the form of mouldings, and overhead line insulators, both for power and telegraph work. Sheets of "Southalite," which is a synthetic resin base with a paper filler, are shown.

Pritchett & Gold & E.P.S. Co., Ltd.

This exhibit includes examples of accumulators for power stations, country-house lighting, train and yacht lighting, &c. The latest product shown is a closed top cell (fig. 12), which, it is said, has all the advantages of the ordinary sealed cell, while the lid is easily removed. The acid-tight lid is made of impregnated teak fitted in with a rubber gasket The terminals and connections are so designed that connecting up with reversed polarity is impossible. The correct acid level is indicated, and the bottom bars are distinct for positives and negatives.

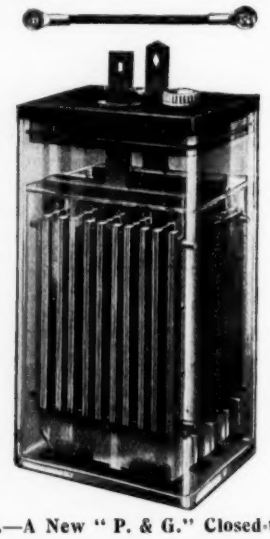


Fig. 12.—A New " P. & G." Closed-top Cell.

Jackson Electric Stove Co., Ltd.

The principal exhibit upon this stand is the first of a new range of " Jackson " cookers. The appearance of this is rather different from that of the usual cooker, as will be observed from fig. 13. The chief features of the new design are increased hob and hot-cupboard space without extra width, the hot-cupboard being fitted with a drop-down door. The interior of the oven is enamelled all over, as are the racks and shelf, and all the corners are rounded. The black parts are stove enamelled and the hobs are of " Marblon " mottled porcelain. It is claimed that the lagging is considerably improved, and improved protected free-spiral boiling plates are fitted. Other models of cookers are shown. A number of storage water heaters also appear. These are designed on the " push " system, and range from 2½ to 30 gallons in capacity. The prices have recently been reduced considerably. Samples of the company's fires with plugged-in elements are to be seen, and among the other domestic appliances is a new kettle fitted with an automatic cut-out device. In this the cut-out is reset by a plunger after operation; there are no renewable parts in the device.

Fig. 13.—A New " Jackson " Cooker.

Camille Espir, Ltd.

Empire reversible-gimbal and conical parchment shades appear on this stand. There are also switch plates in plain and opal glass, and accessories of numerous kinds for telegraph, telephone, lighting, and bell work. Objects in the following materials are shown: Hardwoods, ivory, fibre, vulcanite, erinoid, and celastoid. The company's aim is to manufacture a sound article in a colour suitable to its surroundings.

Burnley Components, Ltd.

The chief exhibit is the " Burco " electric washing and wringing machine (fig. 14). In this there is a cypress tub with a wooden dolly which is driven through machine-cut gears. The wringer is of aluminium, is reversible, and can also be moved into different positions. The whole of the metal parts on the machine are finished in cellulose paint so that rusting is prevented. Other exhibits are " Burco " electric wash boilers, electric fires, and electric urns.

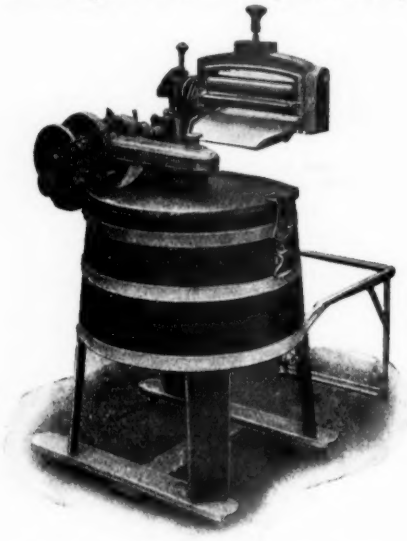


Fig. 14.—The " Burco " Electric Washer.

J. A. Brook.

The " J.A.B." lamp lock and its applications are exhibited on this stand. The examples shown include what is claimed to be the only lamp lock on the market suitable for use with the Home Office type (shrouded) lampholder.

London Section.

The feature of the London Section from an electrical point of view is certainly the fine collection of wireless apparatus and accessories, primary and secondary batteries, component parts, and raw materials. Electric clocks and electromedical and X-ray apparatus are well represented, and electrical advertising signs speak for themselves; electroplated goods, of course, make a brilliant show.

Dowsing Radiant Heat Co., Ltd.

Amongst the specialities long associated with the name of Dowsing, such as luminous radiators, cordless and " hot-point " irons, and immersion heaters, we noticed a folding limb light-bath, rated at 750 watts, and weighing about 22 lb.; this device can be closed very quickly into a size and shape convenient to carry about. A sealing-wax heater with an automatic release is another interesting appliance.

Bower Electric (1926), Ltd.

Artificial-sunlight apparatus are prominent on this stand, including the " Uvral " quadruplex ultra-violet-lamp with four arcs in series, taking five amperes only, from the mains; the starting resistance is cut out when the arc is struck, leaving only a small ballast resistance in circuit. An electric " Expometer " devised by this company contains a little motor, which has the advantage of running a little slower on a.c. than on d.c., thus automatically giving the longer exposure required with alternating current. Various professional models for diathermy, sinusoidal currents, and high-frequency treatment, are shown.

Bellingham & Stanley, Ltd.

A new pattern of the " Uvir " ultra-violet-ray lamp is exhibited, using special electrodes of a new alloy, which give a very steady arc without the emission of fumes; though much cheaper than tungsten electrodes, the alloy is claimed to give five times the intensity, at the best wave-lengths. Standard spectrometric apparatus is shown, including an ultra-violet ray spectroscope, which can be used as a hand instrument. A notable feature of the " Uvir " lamp is the use of solid heating elements, acting as the series resistance and directing a beam of heat on the patient.

Betax Manufacturing Co., Ltd.

This firm shows ultra-violet and radiant light and heat apparatus, including a universally adjustable u.v. home model, the " Sun-a-wave " projector, for use in conjunction with u.v. apparatus, and professional patterns. Hot-air douches and inexpensive hair driers, in various styles, are shown.

Electrical Exports of Germany.

Figures for 1926 and 1927 compared.

THE following statistics showing the value (in thousands of Reichsmarks), weight in double centner (equals 220 lb.), and in some instances the number of pieces, of electrical apparatus exported from Germany in 1927, are based on the official foreign trade returns of that country. The figures for 1926 are added for purposes of comparison, but it should be noted that whereas the 1927 totals include exports on reparation account, certain of those for 1926 exclude such shipments. With regard to the destinations of the exports of dynamos, motor, convertors, and transformers, Argentina, Holland, Austria, and Czecho-Slovakia figure prominently amongst the destinations of machines up to 150 kg. in weight; Russia, Argentina, and Brazil were good customers for those from 150 kg. to 3,000 kg., whilst of those over 3,000 kg. 70 went to Argentina, 72 to Spain, 243 to Russia, and 64 to the Dutch East Indies during last year.

	1926.	1927.	Inc. or dec.
Electric lighting and starting apparatus for motor vehicles—			
Value	1,657*	5,710	+ 4,053
Number	57,914	65,954	+ 8,040
(Double centner)	1,401	5,034	+ 3,633
To Czecho-Slovakia ,,	5,812	17,358	+11,546
,, Austria ,,	2,206	13,463	+11,257
,, Italy ,,	3,192	8,936	+ 5,744
Dynamos, motors, convertors and transformers up to 5 centner—			
Value	22,682*	27,007	+ 4,325
Number	341,426	512,661	+171,235
(Double centner)	67,586	86,845	+19,259
Ditto, from 5 to 30 d.-centner—			
Value	11,774*	17,707	+ 5,933
Number	5,072	7,642	+ 2,570
(Double centner)	55,504	79,125	+23,621
Ditto, over 30 d.-centner—			
Value	13,575*	15,070	+ 1,495
Number	791	957	+ 166
(Double centner)	86,605	86,206	- 399
Carbon brushes, microphone carbons, &c.—			
Value	831	1,109	+ 278
(Double centner)	546	660	+ 114
Arc lamp carbons—			
Value	1,655	1,768	+ 113
(Double centner)	6,813	6,836	+ 23
Electrodes—			
Value	7,963*	7,942	- 21
(Double centner)	226,539	207,837	-18,702
Telegraph or telephone insulators—			
Value	6,185	7,097	+ 912
(Double centner)	58,895	67,238	+ 8,343
To Russia ,,	4,207	7,054	+ 2,847
,, Switzerland ,,	6,961	5,803	- 1,158
,, India ,,	539	4,937	+ 4,398
,, Dutch East Indies ,,	2,571	4,106	+ 1,535
,, Irish Free State ,,	514	4,145	+ 3,631
Ignition apparatus, other than magnetos, and accessories for motor vehicles—			
Value	12,119	16,874	+ 4,755
(Double centner)	10,977	13,525	+ 2,548
To Great Britain ,,	1,181	726	+ 455
,, Italy ,,	859	751	- 108
,, Holland ,,	565	960	+ 395
,, Czecho-Slovakia ,,	809	1,117	+ 308
,, United States ,,	2,781	3,685	+ 904
Telephone material—			
Value	29,633*	21,825	- 7,808
(Double centner)	16,432*	11,839	- 4,593
To Holland ,,	1,490	1,084	- 406
,, Switzerland ,,	749	504	- 245
,, Japan ,,	1,267	723	- 544
,, Italy ,,	4,446	2,508	- 1,938
Measuring and recording instruments—			
Value	30,619*	32,936	+ 2,317
(Double centner)	28,333	28,210	- 123
To Gt. Britain ,,	1,469	1,871	+ 402
,, Italy ,,	5,281	3,309	- 1,972
,, Holland ,,	3,025	2,634	- 391
,, Russia ,,	1,418	2,281	+ 863
,, Sweden ,,	1,325	1,644	+ 319
,, Spain ,,	1,242	1,438	+ 196
,, Czecho-Slovakia ,,	953	1,062	+ 109
,, Japan ,,	913	1,274	+ 361
,, Argentina ,,	2,748	2,256	- 492
Wireless material—			
Value	31,636*	41,983	+10,347
(Double centner)	29,021	35,412	+ 6,391
To Denmark ,,	2,811	3,160	+ 351
,, Gt. Britain ,,	11,353	10,795	- 558
,, Holland ,,	1,854	3,162	+ 1,308
,, Sweden ,,	2,440	2,711	+ 271
,, Japan ,,	482	200	- 282
,, Argentina ,,	460	1,171	+ 711
Metal filament lamps—			
Value	20,305	25,893	+ 5,588
(Hundreds)	488,035	554,392	+66,357
(Double centner)	9,103	10,257	+ 1,154
To Denmark ,,	24,396	30,533	+ 6,137
,, Finland ,,	11,699	12,331	+ 632
,, France ,,	7,328	10,700	+ 3,372
,, Gt. Britain ,,	86,552	73,606	-12,946
,, Italy ,,	32,015	44,462	+12,447
,, Norway ,,	9,301	14,723	+ 5,422
,, Austria ,,	30,072	—	-30,072
,, Mexico ,,	10,700	12,624	+ 1,924
,, Sweden ,,	33,829	34,721	+ 892
,, Switzerland ,,	12,736	11,787	- 949
,, Czecho-Slovakia ,,	30,437	33,098	+ 2,661
,, China ,,	17,299	14,370	- 2,929
,, Argentina ,,	20,134	26,187	+ 6,053
,, United States ,,	11,039	11,203	+ 64
,, Brazil ,,	6,086	†	—
Armatures and commutators—			
Value	5,106*	6,650	+ 1,544
(Double centner)	16,421	15,387	- 1,034
Accumulators, plates, &c.—			
Value	8,212*	8,165	- 47
(Double centner)	49,778	44,919	- 4,859
To Denmark ,,	12,998	9,111	- 3,887
,, Finland ,,	850	1,682	+ 832
,, Gt. Britain ,,	1,125	†	—
,, Holland ,,	6,546	9,497	+ 2,951
,, Sweden ,,	16,386	8,871	- 7,515
,, Argentina ,,	1,509	1,942	+ 433
Electric cable—			
Value	54,893*	40,662	-14,231
(Double centner)	471,273	425,956	-45,317
To Denmark ,,	3,177	†	—
,, Gt. Britain ,,	11,424	13,082	+ 1,658
,, Italy ,,	1,022	†	—
,, Holland ,,	127,960	133,254	+ 5,294
,, Norway ,,	12,633	9,058	- 3,575
,, Sweden ,,	†	19,326	—
,, Poland ,,	9,844	11,600	+ 1,756
,, Argentina ,,	54,039	59,645	+ 5,606
,, Spain ,,	20,956	2,903	-18,053
,, Japan ,,	17,497	4,825	-12,672
,, Finland ,,	10,634	15,249	+ 4,615
Electric safety and signalling apparatus—			
Value	5,159*	5,765	+ 606
(Double centner)	9,299	9,419	+ 120
To Denmark ,,	452	292	- 160
,, Gt. Britain ,,	4,302	3,864	- 438
,, Italy ,,	338	283	- 55
,, Holland ,,	705	1,147	+ 442
Galvanic batteries and parts and heating elements—			
Value	10,714*	13,093	+ 2,379
(Double centner)	53,404	63,734	+10,330
To Gt. Britain ,,	27,159	36,371	+ 9,212
,, Holland ,,	6,531	5,643	- 888
,, Sweden ,,	6,074	5,764	- 310
Insulating material of asbestos, mica, and micanite—			
Value	571	569	- 2
(Double centner)	492	612	+ 120
Electrical apparatus for lighting, power transmission, electrolysis, resistances, &c.—			
Value	68,100*	85,381	+17,281
(Double centner)	197,590	242,394	+44,804
To Finland ,,	5,698	9,129	+ 3,431
,, Gt. Britain ,,	19,410	18,809	- 601
,, Holland ,,	24,818	29,511	+ 4,693
,, Austria ,,	8,459	12,705	+ 4,246
,, Russia ,,	9,878	22,622	+12,744
,, Sweden ,,	11,297	13,389	+ 2,092
,, Dutch East Indies ,,	6,168	11,372	+ 5,204
,, Argentina ,,	12,634	15,115	+ 2,481

* Excluding reparation deliveries. † Figures not available.

There are other items which it is impossible to include, owing to considerations of space. The three following are, however, noteworthy :—

Electric irons value in thousand marks	1,409
Electric heating and cooking apparatus, value in thousand marks	5,946
Electric medical and dental apparatus value in thousand marks	16,002

The total value of the exports in 1927 of electrotechnical products was 398,716,000 marks, including reparation material, whereas the total in 1926, excluding reparation material, was 352,989,000 marks. Imports in 1927 were 33,462,000 marks in value, and in 1926 only 21,652,000 marks.

The Electrical Wholesalers' Federation.

Annual Dinner.

MR. F. C. BARNETT, president, occupied the chair at the annual dinner of the E.W.F. at the Savoy Hotel, London, on February 16th; there was a company of about 300.

After dinner and the loyal toast, Col. WILFRED ASHLEY, M.P., Minister of Transport, proposed "The Wholesaler in Industry." He said that one of the objects of the E.W.F. was advertising and propaganda. Publicity was essential if the electrical industry was to secure the rural areas; the towns could take care of themselves. He thought that the electricity scheme would prove a success. Already Central Scotland had been dealt with and the South-East England scheme was nearly ready and would be published in a short time. It was hoped that the whole country would be mapped out within eighteen months. Another meeting of the conference on the supply of electricity in rural areas was to be held next month. The Electricity Commissioners had nearly finished their consideration of the question of relaxing the restrictions upon overhead transmission lines, and their conclusions would be published in three or four weeks' time. A slight easing of the rules would make a great deal of difference in the cost of those lines. The electricity supply industry had made a great advance during the past year and had increased its sales of energy by 24 per cent., which was a record. In the manufacturing industry, foreign competition had forced producers to work at a very small margin of profit in both the home and foreign markets. Great Britain had increased its share of the world's electrical export trade from 23.4 per cent. in 1913 to 31.2 per cent. in 1927, while Germany's share had fallen from 48.5 to 30.3 per cent., and the share of the United States had risen from 17.7 per cent. to 29.2 per cent. The number of workers in the industry was greater than ever before and unemployment was very small. There was no doubt that electricity was the motive power of the future.

Mr. A. G. BEAVER, responding, said that the wholesaler's lineage was ancient and honourable. In all trades which had reached any magnitude he had played a large and important part in stabilising the output and reducing the distribution expenses of manufacturers. All manufacturers did not recognise his importance, and very often took opportunities to short-circuit him. The electrical wholesaler was a free lance and could bring an unbiased opinion to bear on the merits of products. Sometimes, of course, he handled American or Continental goods, but that was not a bad thing, for it acted as a spur to British manufacturers to do their best. He always gave British goods the preference, getting quality for quality and a square deal. The manufacturers were inclined to ignore the smaller wholesalers, although they fulfilled a useful function by carrying stocks and rendering service. Mr. Beaver read a long passage from an American article in which the indispensability of the wholesaler was set out in reasoned form.

Sir HAMAR GREENWOOD, K.C., M.P., proposed the toast of the Association, and in doing so recollected the early experiments of Edison and Bell. He said that from Niagara there proceeded many miles of overhead transmission lines, and Canadians were none the worse for them. He considered that if wholesalers were not fulfilling a useful function they would have died out. Their Association was an example of national co-operation; he hoped that it would extend its efforts to international agreement, for such agreement was a guarantee against wars. There was a need for greater publicity; the Association put it at the end of its list of objects, but the speaker hoped that it would be one of the first to be put into effect. Their daily hymn and nightly prayer should be: "More light, more heat, more power."

Mr. BARNETT replied, stating that the Electricity (Supply) Act had brought all sections of the industry into closer touch. In the last few years mushroom wholesalers, price cutters, had sprung up all over the country. This made the Association all the more essential. The credentials of applicants for membership were severely scrutinised, and only one out of ten was accepted. The real wholesaler carried adequate stocks in good and bad times and was able to give efficient service at terms equivalent to those of the manufacturers. The manufacturers could not handle small quantities, and, besides that, wholesalers were better acquainted with the standing of customers and thus avoided losses.

Mr. G. P. DENNIS proposed the health of the guests, and said that many distinguished men were present with them, not only from all parts of this country but also from the Continent. He referred to Col. Ashley's part in the passing of the Electricity Act, and said that the industry expected great things from the Act. The speaker made mention of a number of representatives from electrical associations and institutions, and expressed the company's regret at Mr. D. N. Dunlop's absence on account of the death of his father.

Sir WILLIAM BULL, M.P. (President, Radio Manufacturers' Association), in the course of his reply said that the wholesalers really filled a want, and that want would continue. The manufacturers were glad to think that they had the wholesalers' backing. He made mention of the withdrawal of the contract awarded to a Swiss firm by the Stockport Corporation, and said that the country was beginning to realise that industries which were badly hit by unfair foreign competition should be protected.

Mr. LL. B. ATKINSON (director, Cable Makers' Association) said that his Association was the oldest in the electrical industry. We had proved in this country that Associations were far better than trusts and cartels. The manufacturer was a free buyer, but he was organised in selling. For many years the C.M.A. and E.W.F. had had a joint committee by means of which agreement, or a large measure of agreement, had been reached in many directions.

Mr. A. NICHOLS MOORE (vice-president, I.M.E.A.), who also responded, said that after all discussion the fact remained that the distributing authority was the principal factor in the electricity supply industry. He had recently been given a great deal of publicity, in common with other municipal electrical engineers, on account of his undertaking having purchased foreign plant. He thought that statements were sometimes hurriedly made which might be regretted later. He gave a humorous account of imaginary happenings "in a well-known house in Kingsway."

The toast list ended with the proposing of the chairman's health by Mr. Theodore Stretton, president-elect of the Association; Mr. Barnett briefly responded.

An excellent concert was provided by Messrs. Robert Easton, Norman Long, and J. W. Francis, Miss Lilian Myers, and an orchestra conducted by Miss Lilian Brion.

Parliamentary News.

(By Our Special Parliamentary Reporter.)

Private Bills.

The following private Bills have been read a second time in the House of Commons :—London County Council (Tramway, Subway and Improvements) Bill, and the Shropshire, Worcestershire and Staffordshire Electric Power Bill.

Plant for the National Schemes.

On February 14th, Captain FANSHAWE asked the Minister of Transport how many contracts had been placed abroad for material and plant necessary to carry out any work under the provisions of the Electricity (Supply) Act, 1926.

Colonel ASHLEY said he had no control over the letting of contracts in connection with the work arising out of the Electricity (Supply) Act, 1926. He understood, however, that the only contract yet placed by the Central Electricity Board had been given to a British firm.

The Proposed Battersea Station.

On February 15th, Sir W. DAVISON asked the Minister of Transport if he would inform the House as to the date or dates on which notice was given to the royal borough of Kensington and the borough of Chelsea, respectively, as to the holding of a public inquiry by the Electricity Commissioners in connection with the proposed super-power station at Battersea; whether he was aware that a similar proposal for the erection of a large power station at Battersea was rejected by a Committee of the House of Commons some 20 years ago, both on the ground of the high cost of erecting a station of the kind in Central London, and also of the undesirability of further polluting the London area in connection with the consumption of large quantities of coal; and if he would say why these considerations had not had weight in connection with the present proposals.

Colonel ASHLEY said he understood that the company's application for the consent of the Electricity Commissioners to the establishment of the generating station was advertised in March last, and a notice of the public inquiry held by the Commissioners in June last was given to all bodies and persons who had at that time lodged representations in respect of the company's application, but that no such representations had been received from the two Councils mentioned. As regarded the last part of the question, if the hon. member was referring to proceedings on the Bill which became the London (Westminster and Kensington) Electric Supply Companies Act, 1908, the provisions of that Act expressly contemplated that generating stations might be erected on sites not specified in an Act of Parliament, provided that the approval of the Commissioners of Works had been obtained. Before arriving at their decision the Electricity Commissioners gave full consideration to the question of smoke consumption.

Institution of Electrical Engineers.

Joint Meeting with the American Institute of Electrical Engineers.

ON Thursday afternoon last week, February 16th, an event of historic interest took place, partly in London and partly in New York—namely, a joint meeting of the British and American Institutions. At the London headquarters of the I.E.E., Mr. Archibald Page, president, and the Council, with a number of invited guests, met in the Council Room, and a full attendance of members in the Theatre, at 3.20 p.m. At the invitation of Mr. Page, Colonel T. F. PURVES, O.B.E., M.I.E.E., Engineer-in-Chief of the British Post Office, explained that the American Institute of Electrical Engineers was holding its mid-winter Convention in the Auditorium of the Institute in New York; two papers on the subject of transatlantic telephony were being presented there, and Mr. Waterson, of the American Telephone and Telegraph Company, was on the point of completing the reading of the first of these papers. The joint meeting of the two institutions, in London and New York, would be held as soon as he had finished. They were using for the purpose the transatlantic telephone system between Great Britain and the United States which had been in operation since January of last year, and which provided regular public telephone service between the whole of the United States and a large portion of Canada on the one side, and the whole of Great Britain and several of the Continental nations of Europe on the other. They would be using the transatlantic radio link of about 3,000 miles, and about 1,200 miles of land line. The land line on this side connected them with the radio transmitting station at Rugby and with the receiving station at Cupar, in the Scottish Kingdom of Fife. On the other side it connected New York with the transmitting station at Rocky Point, Long Island, and with the receiving station at Houlton, Maine. Loud speaking receivers were provided on each side, so that the audiences might hear the whole of the proceedings. Simultaneously Mr. Charlesworth, in New York, explained the arrangements to the members of the American Institute.

After formal greetings had been exchanged, Mr. GHERARDI, President of the American I.E.E., invited Mr. Page, as President of the senior Society, to act as chairman of the joint meeting. Mr. Page expressed his appreciation of the honour, and predicted that the proceedings would mark an important milestone in the advancement of electrical science. He then invited Mr. Gherardi to address the meeting.

Mr. GHERARDI greeted the members of the Institution on behalf of the American Institute, of which about one thousand members (as well as a large number in an overflow meeting) were in attendance. He said it was with the greatest satisfaction that, as a result of the accumulated work of the scientist, of the inventor, and of the electrical engineer, it was possible for them to hold this joint meeting—the first of its kind. It was with feelings of deep appreciation and respect that they thought of the men who had exemplified the ideals of our organisation—of Faraday, of Maxwell, of Kelvin—and of the many others, past and present, who had contributed to electrical engineering and to the scientific foundations upon which it rested. These developments had contributed in the greatest degree to the welfare of the world. The telephone art had been improved year by year until continents had been spanned and, at last, even the limitations of the Atlantic Ocean had been overcome. Transatlantic communication had made that meeting possible, and had added one more to the many ties existing between the two Institutions.

Mr. PAGE, on behalf of the Institution of Electrical Engineers, expressed his thanks for the kind message of goodwill, greeted the president and members of the American Institute with feelings of the utmost warmth and good comradeship, and said that there were present specially invited guests, the Council of the Institution, many of whom had travelled long distances to be present, a large percentage of the members of our Wireless Section and an overflow meeting. The telephone must rank as one of the greatest inventions of the 19th century; our indebtedness to Graham Bell grew with the years, and his memory, with that of Franklin and Henry, would be cherished as became such benefactors of mankind.

The commercial radio services now at our disposal ensured closer and closer association between the English-speaking races, whereby the bond of friendship was materially strengthened; he rejoiced that the two Institutions could combine in the future even more effectively than in the past, and that this was the outcome of the splendid work done in one of the branches of their own profession.

He then called upon Dr. JEWETT, one of the vice-presidents of the American Telephone and Telegraph Company and a past president of the American Institute of Electrical Engineers, who said he was gratified to participate in an event which marked both a notable advance in electrical communication and a pioneer demonstration of a wider use for electrical communication. When in London more than a year ago they had discussed details of just such a meeting as this at a time when the channels of communication were not yet in operation—a striking evidence of the sound basis which underlay present-day electrical engineering. The success of the occasion was significant in that it was the tangible evidence of a co-operation both intimate and full between men so situated as to make co-operation difficult.

The Chairman then called upon Col. PURVES, vice-president of the Institution, who said it was an honour and a privilege to be associated with that notable event, which was breaking new ground in the advance of nations towards closer relationship. It opened up the prospect of results which thrilled the imagination and were bound to be beneficent, and to conduce, by way of clearer mutual understanding, to the good of mankind. They had just been shown a motion picture which illustrated in a very vivid and interesting way the initiation and progress of a transatlantic telephone conversation between San Francisco on the Pacific Ocean and Plymouth in Old England. They were not yet able to place it simultaneously before the eyes of those who were sitting in New York, but some of them, at least, had seen it already; the greater part of it was made on that side, and he had to thank their president very heartily for letting them have the completed film.

As they sat and talked to each other their speech was launched into the air, by the radio transmitting stations at Rugby and at Rocky Point, with an electromagnetic wave energy of more than 80 horse-power, and the combined effect of the various refinements and special devices included in the transmitting and receiving systems was to make the speech-carrying efficiency of each unit of this power many thousands of times greater than that of an equivalent amount of power radiated by an ordinary broadcasting station. Many further improvements were still being studied.

The CHAIRMAN then called upon General JOHN J. CARTY, vice-president of the American Telephone and Telegraph Company, and a past president of the American Institute of Electrical Engineers, first congratulating him on the presentation of the John Fritz medal on the previous evening.

General CARTY, after expressing his thanks for the reference to the award of the medal, proposed a resolution in the following terms: "Whereas on this sixteenth day of February, 1928, the members of the Institution of Electrical Engineers assembled in London, and the members of the American Institute of Electrical Engineers assembled in New York, have held, through the instrumentality of the transatlantic telephone, a joint meeting at which those in attendance in both cities were able to participate in the proceedings and hear all that was said, although the two gatherings were separated by the Atlantic Ocean; and as this meeting, the first of its kind, has been rendered possible by engineering developments in the application of electricity to communication by telephone; therefore:

"Be it resolved that this meeting wishes to express its feelings of deep satisfaction that, by the electrical transmission of the spoken word, these two national societies have been brought together in this new form of international assembly, which should prove to be a powerful agency in the increase of goodwill and understanding among the nations; and be it further resolved that a record of this epoch-making event be inscribed in the minutes of each Society."

At the request of the CHAIRMAN, Sir OLIVER LODGE seconded the motion. After expressing his appreciation of the opportunity to take part on that historic occasion, he said it was right and fitting that a record of the transmission of human speech across the Atlantic should be placed upon the minutes of those Societies whose members had been instrumental in making such an achievement possible. All those who in any degree had contributed to such a result—from Maxwell and Hertz downwards, including all past members of the old British Society of Telegraph Engineers—rejoiced at this further development of the power of long-distance communication. Many causes had contributed to make it possible. That speech was transmissible at all was due to the invention of the telephone; that speech could be transmitted by ether waves was due to many things, but especially the invention of the valve or "tube" and the harnessing of electrons for that purpose; that ether waves were constrained by the atmosphere to follow the curvature of the earth's surface was an unexpected bonus on the part of Providence, such as was sometimes vouchsafed in furtherance of human effort.

The actual achievement at which they rejoiced, and which posterity would utilise, must be accredited to the enthusiastic co-operation and to the scientific and engineering skill of many workers in the background whose names were not familiar to the public, as well as to those who were well known.

The union and permanent friendliness of all branches of the English-speaking race, now more firmly established than ever, was an asset of incalculable value to the whole of humanity. Let no word of hostility be ever spoken.

The CHAIRMAN then put the motion to the joint meeting, and it was carried unanimously. In adjourning the meeting, Mr. PAGE said that it had been eminently successful, and that they would regard it as the forerunner of many more to come.

Mr. GHERARDI expressed thanks for the gracious manner in which Mr. Page had acted as chairman of the meeting, the first of its kind, and the proceedings closed with "Good-bye, New York."

Modern Electric Wiring.

A constructive criticism of the systems and methods of wiring in vogue, with suggestions calculated to help in the work of spreading the use of domestic electricity.

By DONALD SMEATON MUNRO, M.I.E.E.

(*Abstract of a paper read before the* INSTITUTION OF ELECTRICAL ENGINEERS.)

THE paper outlines the more common modern wiring systems readily available, and suggests means and methods by which they are, or might be, applied with most advantage, particularly to the smaller class of house.

Wiring methods have been influenced not only by climate, differing temperatures and sea-atmospheres, but also by our variety of supply conditions and the early adoption of pressures considered unsafe for domestic use, even by such commercial nations as the United States and Germany. The gradual evolution on d.c. from the lower pressures to 250 V, and our successive relaxing of rules governing the loading of cables, have permitted us to meet with comparative ease the limited increase of the power load in the older houses. Perhaps this very adaptability of our early installations has given some engineers too much confidence. It appears to the author that we have now reached a critical point in the history of wiring, a point at which all work should confirm to certain clearly defined limits and principles. The foreshadowed changes in supply conditions should be prepared for now, and every contemplated installation should be arranged and wired to suit the ultimate standard pressure.

Wood casing, which was designed originally to ensure the complete separation of the two polarities throughout an installation, has now degenerated into a wood-trough system for the tidy conveyance of bunched cables. The proper and efficient fitting of wood casing is now too expensive in labour to justify its inclusion among modern wiring methods in general use. Cleat systems, in which china insulators are employed to fix vulcanised-rubber cables or flexibles, while providing the cheapest possible means of wiring, are obviously unfitted for domestic purposes beyond, perhaps, the requirements of wooden huts or other temporary dwellings. Improved methods of manufacturing cable have gradually eliminated the necessity for supplementing the cable makers' insulation by something extraneous, such as the fillet in wood casing or the distance piece of a china cleat.

Cab-tire sheathing was primarily devised for flexible cables in mines and workshops, and was applied to that purpose with success about 16 years ago. As a protective covering for flexible cable it is ideal. It does not kink, and it slips and bends out of threatened mechanical aggression as no other class of armour can. This type of cable has other qualities most valuable for general wiring work. It is moisture-proof and is apparently not affected by plaster or cement. It is inconspicuous and light in weight; its smooth outer surface lends itself to the application of oil paint or distemper; and it is not readily ignited. The extreme portability of the cable, and the simple tools necessary for its erection, reduce to a minimum the time required for placing it in position. While the sheathing is waterproof, some care is, of course, necessary when it is being fitted in damp places. In respect of capillary action, it may appear to be better to discard the usual 3/.029 in. or 3/.036 in. circuit cable for a conductor of solid section. The solid wire also has advantages in setting over cornices and mouldings. There might be a danger here, in that the extreme resilience of the covering would tend to hold a broken wire in contact until an unusual loading caused ignition.

A more recently introduced system with insulation of the compound class, Maconite, has attained a high degree of recognition throughout the country. This form of compound insulation can be supplied with a lead-alloy covering directly applied, and as the complete cable is free from any fibrous layer or constituent, the risks of surface leakage at the cable ends are obviated. Maconite is of the most general interest, however, when it is considered as surface-system cable, without lead or braided protection.

Modern lead-covered cables are sheathed with what is called by their sponsors "a special metal," and are alluded to in the I.E.E. Wiring Regulations as having "a covering containing not less than 95 per cent. of commercially pure lead (the remainder consisting of rarer metals)." The latter part of the description is calculated to inspire respect, but is popularly taken as implying the use of a small percentage of antimony which, when alloyed with lead, as with aluminium, imparts qualities of hardness and tensile strength. This much-used brand of lead-alloy cable is insulated with two layers of vulcanised rubber, and then taped in a distinctive colour before being sheathed. It is made in single, twin and triple form, the multiple forms being of oval or flat section. It is primarily to secure watertightness and good metallic continuity that such cable is adopted, and it is regrettable that so many of the junction and outlet boxes issued for lead-covered work do not ensure the first quality and only inadequately provide the second. With screwed-conduit systems we have a protector which is itself robust, and boxes (to protect the weaker points, *e.g.*, joints, &c.) which are relatively heavier and even more enduring. With lead-covered systems the reverse is the rule, and the boxes are more fragile than the sheathing.

The practice of placing stamped bonding rings in the recesses of wood blocks should not be encouraged; the bonds are invisible and the metal ring is too near the china connectors, which are necessarily also concealed beneath the blocks. The soldering of bonds is suggested in the I.E.E. Wiring Regulations, but even this has its dangers, and in the present-day struggle to keep down costs it is rarely resorted to as a means of attaining continuity. Pinching-screw contacts, with a material so soft and inelastic as lead, do not inspire confidence and one feels that there is a need for more strict specification for the dimensions and tinning of clamp bonds for this most useful class of cable before the system can be conscientiously recommended as reliable and safe. The lead-covered cable has the advantage that it automatically indicates those particular faults caused by nails which actually touch the contained live wire.

Zinc conduit played a useful part in the early development of wiring, and in various forms is still popular on the Continent. It is practically incorrodible under all ordinary conditions and responds so readily to temperature-changes that condensation is unknown. The unscrewed light-gauge steel conduit was found to be too susceptible to rust for general adoption, while its enamelled slip-in couplings prevented metallic continuity. The author was among those who first tried to remedy this latter disability by designing various forms of couplings with pinching screws, compressing nuts and other devices. One is always doubtful, however, of the permanent effectiveness of a multiplicity of pressure contacts in series.

The three classes of heavy-gauge electrical conduit are welded, brazed and solid-drawn, and the first is by far the most popular. The standard sizes range from ½ in. external diameter to 2½ in. From figures supplied to the author from the leading makers it is evident that the order of the demand for these is as follows:—

- ¾ in. chiefly for London, Glasgow, Manchester, Birmingham, Edinburgh, and the larger towns.
- ⅝ in. rivals the ¾ in. size in popularity, and the area of use is more widespread.
- 1 in., 1¼ in., 2 in., and 2½ in. sizes follow the ⅝ in. in diminishing demand as the larger sizes are reached.
- ½ in. size is in very small request: some makers report that the demand is practically nil.

The above order is, of course, based on the length supplied and not on the cost.

When the conditions are severe, as in outside work, the conduits are preferably galvanised and coated with aluminium or red lead paint at the couplings. In addition to the more usual tube treatments, *e.g.*, hot galvanising or electro-galvanising, there is now available a zinc-impregnated conduit of exceptionally smooth finish and ductility. The manufacturing process of this "Z.I.R." conduit consists of heating the cleaned steel conduit is a muffle furnace, along with a special zinc compound, for a prolonged period and at a definite high temperature until the zinc sublimes and permeates the pores of the exterior and the bore of the conduit. The matt-grey surface of this special conduit is attractive and the product stands up to most severe salt-spray tests.

The British Standard Specification for Electrical Conduits says nothing with regard to cold bending qualities and internal freedom from metallic obstruction. Nevertheless, it is wise when ordering conduit from an unknown source to stipulate for B.E.S.A. conduit, and also to check samples with a reference gauge, for much time is wasted if the screwed ends of conduit or couplings have to be re-tapped to make them fit.

(*To be continued.*)

Joint Discussion in London on the Papers of Mr. Munro and Messrs. Milne & Rawll.

Colonel W. A. VIGNOLES, in opening the discussion, said he took the paper as a plea for the screwed-conduit system. The expense was not the only objection to that system; the bulk of business in the future would be done in old houses. He advocated the earthing of the apparatus in all rooms and the provision of sufficient "outlets" for heating on new installations. The success of domestic electricity was largely wrapped up with the 2-part tariff. Referring to the ring-circuit proposal, he thought there might be difficulty in paralleling the fuses at the ends. He considered that ¾d. per kWh was an economical proposition for electric cooking.

Mr. H. J. CASH saw no reason why the bunching of wires should be restricted as long as the conduit used was large enough. He thought the suggestion for having grey conduit was excellent. The boring of a hole in the conduit would not prevent condensation. The quantity of water which would rot the insulation would hold in the tube by surface tension; but condensation was not an important matter so long as the conduit could breathe. Fusing troubles were going to increase; a large number of Home Office patterns were not suitable for modern conditions. The time was coming when fuse cases would have to be lined with a non-hygroscopic material. He thought that 1/.044 wire was as good as 3/.029; he had done first-class work with 1/18 for years.

Mr. A. HUGHES deprecated the idea of driving pins through the webbing between twin cables, because of the possibility of secondary action between the pin and the insulation; and there was always a possibility of the pin running too close to the dielectric.

Mr. F. C. RAPHAEL did not think it worth while using the fragile types of boxes which were on the market. He would be nervous to carry earth wires through with l.c. cable. There would be a good deal of trouble when earth wires came to be used extensively. The one-way connector was not popular with wiremen, and porcelain connectors would soon be a back number; there were some good bakelite ones on the market. He used No. 22 gauge tin fuses for all ordinary installations, and did not leave the fusing to wiremen on the larger installations. Fusing on the neutral was dangerous and dated back to the time when engineers did not know it was necessary to put the switch on the live side.

Mr. J. MILLANY said the P.O. objection to earthed concentric wiring should be overridden. Screwed conduit well erected was the best; poorly done, it was extremely bad. Most conduit work was badly installed. Much trouble could be overcome by using malleable-iron boxes instead of cast ones. A fitting was badly wanted to serve as the block, ceiling rose, and means of suspension for the heavier kinds of pendant fittings. There was no suitable artistic electric bracket fitting on the market.

Mr. E. J. REED thought that interlocking switch-plugs ought to be used. He suggested that some sort of co-operation between the Institution, the E.T.U., and evening schools might result in a better class of wireman. Most of the wiring troubles were in connection with the smaller jobs; for large buildings consulting engineers were usually employed.

Mr. W. A. RITCHIE pointed out that, beyond testing up to the Commissioners' standard, the supply authorities had no right to test installations. Insurance companies did not usually look at ordinary house-wiring, so there could not be very much wrong. His sales department wired 2,000 houses with Maconite, using buckle clips—not pins through the webbing—and the work had been done at the rate of a point per hour. With conduit it would take at least four hours per point. An advantage with this class of cable was that one could take the nearest cut through the joists.

In reply to the discussion, Mr. RAWLL said that it was necessary to have separate tariffs in order to prevent trouble from fuses blowing. It was not possible to compete with other methods of cooking or heating with electricity at over 1d. per kWh. He did not agree with the s.p. fuse suggestion. It was necessary to protect the neutral; the neutral fault was the most dangerous of any: further, the neutral was not always earthed.

In a preliminary reply, Mr. MUNRO pointed out that in many of the present designs of fuses they were forced to use copper. Single wire could be broken by a simple knock. He thought the idea of running a coloured strip along the cable good as far as it went; but what about painting over it? Labour represented only about 50 per cent. of the installation costs. He thought that fuse-blowing troubles would be worse with only a s.p. fuse.

Correspondence.

Correspondents should forward their communications **as early as possible.** *No letter can be published unless we have the writer's name and address in our possession.*

Four-phase Transmission.

Mr. Woodhouse's article, and your Editorial comments on the same, provide food for reflection. I feel, however, that I must take exception to your statement "that a four-phase system has never been put forward for transmission lines."

A reference to my British Patent No. 200,194, and subsequent patents, will show that not only did I commence to appreciate, in 1922, the possibilities, and advantages, of splitting the three phases into six phases (of which, I believe, I was the pioneer); but I had also appreciated the workableness of (what you call) "four-phase" transmission; also, that the latter, as well as the former, introduced opportunities for the protection of circuits without pilot wires.

Surely, however, Mr. Woodhouse has been so occupied with the "protection" question that he has forgotten that if one of the four cables which he proposes breaks down, the *whole* transmission is put "out of court." Now, with the "double-three-phase" transmission, on the lines of my 1922 patent, a failure of one cable only puts *half* the transmission out of action.

In order to make Mr. Woodhouse's scheme equally reliable with the "double-three-phase" scheme, he must introduce two more cables as a connection between the neutral points (h.t. side) at the two ends of the line, and arrange to run during the emergency period (for a few minutes) as a "quarter-phase" system, until the second of the two spare cables can be switched into the place of the faulty cable, as indicated in my patent No. 236,759.

Mr. Woodhouse hints that the "four-phase" system (it is really a two-phase) can be applied to underground cables with advantage.

I can fully substantiate this, and, moreover, can add that there are numerous advantages, which he probably does not know of but which I have during the past two or three years been carefully exploring, and which—taken into conjunction with the use of "Intersheath" cables—will enable an advantage of nearly 1.75 (to 2.0) times over that of an ordinary single-core supertension cable to be realised, in power transmitted for a limiting diameter of cable, and for a limiting temperature of the innermost copper conductor. I hope to publish shortly conclusive figures on this point.

There is also another considerable advantage, *viz.*: that the "capacity-current-kVA," per mile of underground cable, is only two-thirds of that with six cables; consequently the "charging-current-kVA" *per kilowatt transmitted* reduces to something like 40 per cent. of that with single-cored cables. This extends the distance of transmission by two and a half times—say from 40 miles to 100 miles—and is very important indeed.

Lastly, may I say that this letter is not in any sense a disparagement of Mr. Woodhouse's scheme; on the contrary, I think it deserves every possible support, if the "wind" question be not made the strong point.

It should be noted that a single three-phase transmission, transmitting equal power, will give a "sum of diameters" of 2.115 inches—*i.e.*, even better than his "four-phase" proposal; also that the addition of the neutral cables will almost completely knock out the "wind advantage" of his four-phase scheme. *The* advantage of the two-phase proposal is that it retains *twice* the transmitting capacity of the "double-three-phase," when a single cable breaks down; provided the fifth and sixth cables are added.

A. M. Taylor.

Birmingham, *February 17th*, 1928.

I read with interest Mr. Woodhouse's article in your issue of February 17th.

The only point that is not clear to me is how balanced protective gear is arranged on the 4-phase system with its four wires. I should like to see a diagram of the connections of this control gear in relation to the four phases.

J. A. M.

February 20th, 1928.

Accumulator Tests.

I should like to express my appreciation of the firm stand you still take with regard to misleading claims put forward as to battery efficiency. Anyone with any scientific knowledge of secondary batteries would see the uselessness of the test figures given in your issue of September 3rd, 1926, and the subsequent letters on this point were not at all surprising.

One would have thought that these so obviously closed the subject from a technical journal's viewpoint, that what is surprising is the attempt to revive it and maintain that what are admittedly correct figures constitute in any way a wonderful claim or are of any use.

I have noticed several large and conspicuous advertisements in the daily Press since your original comments appeared, where the same claim is foisted on a technically uninformed public. It is a pity that these people cannot be effectively shown how they are being misled by the advertising copy-writer's volubility, for they cannot be induced to read the technical papers.

C. H. Clarke.

London, *February 18th*, 1928.

The Consumers' Engineer.

It is surprising how little it is realised by supply undertakings that a duty and service to their consumers can be turned to good account in their own interest. I refer to the appointment of a consumers' engineer and technical adviser, who acts as medium (and sometimes mediator) between the supply authority and its customers. He forms a personal link between the authority and the householder, and communicates the feeling that the former wishes not merely to sell "juice," but to take a permanent interest in the efficient use of electricity by its consumers. The consumers' engineer is primarily at the consumers' service, to solve any difficulty, and to advise on and discuss all questions which may arise.

The work of an established consumers' engineer is very arduous. He should be young and energetic, of strong personality, a good salesman with sound technical training and about ten years' experience in the electrical trade, a retentive memory, and a capacity for quick thinking, so that he is able to give the best service in both the authority's and the consumers' interests.

Many householders would be pleased to substitute for their old dilapidated fittings something more up-to-date, but they do not know what types to use with their decoration schemes, and the showroom salesman, without seeing the place, cannot hope to make satisfactory suggestions. Here the consumers' engineer steps in and (with the authority of the supply undertaker assists consumers by suggesting certain fittings, and also labour-saving appliances which could be demonstrated in the consumer's own house, often effecting a previously unthought-of sale. In this respect he is *not* competing with the authority's showrooms, but, as an outside agent, he "carries the mountain to Mahomet"—the 50 per cent. of the consumers whom the showrooms do not reach with their necessarily limited range and stocks.

Also the consumers' engineer keeps the company constantly in touch with new buildings and enterprises in the area, and is competent to draw up contracts and estimate for installations, &c.

Thus, as the commercial traveller is necessary to industrial firms, so the consumers' engineer should be a valuable asset to the supply authority's sales turnover.

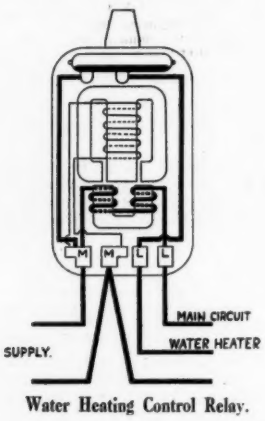
J. H. Miles.

London, *February 14th*, 1928.

Control of Water-heating Load.

The method of controlling the water-heating load outlined by "Invictus" in his letter appearing in to-day's issue of your paper, is one which is catered for by the Ferranti load leveller. This instrument comprises a simple relay connected in the general circuit of the household and mechanically coupled to a gasfilled mercury switch in the water-heating circuit. Adjustment of setting is provided so that, when the demand on the general circuit exceeds a predetermined maximum, the relay operates and disconnects the water heater by tripping the mercury switch.

The principle of one of these instruments, intended for an alternating-current system, is illustrated by the following diagram :—



Water Heating Control Relay.

"Invictus" suggests that the connection or disconnection of the water heater should be made dependent on the lighting demand. Whilst, in certain exceptional cases, this may be desirable, it is generally preferable to control the water-heating supply according to the bigger demand for heating and cooking. With the load leveller coils connected in the general heating circuit, the water heating load serves to fill up the big valleys in the load curves of individual consumers, and is thus more effective in improvement of the load factor for the system.

Ferranti, Ltd.
(R. J. HEBBERT.)

Hollinwood, *February 17th*, 1928.

The British Industries Fair.

It is very satisfactory to those of us who are anxious to see the biggest possible number of visitors from within the British Empire, to note that the questionnaire that is being sent out agrees that the present date is not the best one. There is one point in this connection that I should like to refer to, and that is the one you mention on page 302 of your current issue, namely, that if the Electrical Section decides on a different date from that of the rest of the Fair, then we shall not share in the government publicity allocation. I think the reply to this is that, without any advertising at all, engineers come across from all over the Empire later on in the year. When they get here they will soon discover that there is a Fair. On the other hand, we have already seen that all the government advertising fails to bring them over in any number in February.

Ernest E. Sharp.
(*Director*, VENNER TIME SWITCHES, LTD.)

London, *February 17th*, 1928.

Shoddy Wiring.

As a wireman trained by a firm whose motto was, and is, "Quality Work," I agree with the article appearing in the REVIEW on "Shoddy Wiring." Instilled with the "quality" ideal I once, during a spell of unemployment, undertook a small job on my own, in which I wired five heating points with 7/.029 twin l.c., with separate circuits to each plug. I was told by the Corporation tester that a *firm* in the same district had done a similar job in 3/.029, looping from plug to plug. My profit on the job was small, but my conscience was O.K.! What gives me a pain is that so many firms and public institutions expect skilled wiremen and high-class work when they offer rates like 1s. 3d. per hour. The lowest rate in the contracting industry is officially Grade D, 1s. 4½d., so why should men who have paid premiums round about £40 or £50 for the privilege of learning the electrical trade be expected to work at 1s. 3d. per hour? Surely pay like this is directly responsible for inferior work—at any rate that is all it deserves. Piece-work is another bug-bear of the industry, because, as everyone knows, a wiring job cannot be rushed without something being uncertain. Earthing, bonding, and such like, not being necessary for the actual light, are often conveniently forgotten. The result is that so-and-so can do *n* points in *n* hours—why can't you? I have not worked piece-work and do not intend to. It is a short-sighted policy.

February 13th, 1928. **Fed-up Wireman.**

Electric Cooking.

For the conservation of heat—and hence of current—a low-temperature system of cooking should be advocated, with the necessary attachments fitted to electric cookers.

The proper temperature for cooking albuminoids is from 160 deg. to 170 deg. F. A well-insulated chamber that is maintained at this temperature by a simple electric unit, will perform slowly most of the operations required for our meals. Any kind of stew, or boiled meat dish, steamed or boiled puddings, porridge, coffee (whole beans used), cocoa, &c., can be prepared in such an oven. Thus oatmeal in cold water put in overnight in a water-jacketed basin is ready for breakfast. A pickled tongue of ten pounds in a minimum of water takes twelve hours. The baking of bread and cakes is possible. Delicacy of flavour and tenderness are the characteristics of meat so treated. The process is automatic, and needs no skilled supervision.

The method could be used to reduce an excessive peak-load if facilities for its adoption were forthcoming.

H. Wigley.

Gravesend, *February 15th*, 1928.

[This system is being widely used in Sweden, with the Seves cooker, described in the ELECTRICAL REVIEW of September 17th, 1926, and elsewhere in our pages. Mr. P. J. Pringle, of Ballarat, drew attention to the matter on p. 173 of our issue of January 27th, 1928.—EDS. ELEC. REV.]

Standard Priced Lamps.

I was more than pleased to read Mr. Bowman's contribution on the above subject in your issue of 10th inst., as I am in entire agreement with him on all the points raised, having gained personal experience in connection with an electrical undertaking which consisted of a very large number of the poor classes of consumers.

In several cases, where a free-wiring system was in vogue, it was found that the consumer made use of the lamps supplied in the first instance, and then resorted to the candle, or oil lamp, due entirely to the high price of the E.L.M.A. lamps. I know of supply authorities which have purchased cheap lamps by the thousand and have supplied at the purchased price, and in a great many cases free.

It is hoped that the E.L.M.A. may be able to considerably reduce their present prices, in order that the poor classes may make use of electricity and keep out foreign supplies.

C. Jones.

Walsall, *February 11th*, 1928.

The Marking of Lamps Inquiry.

Our attention has been directed to a statement (which was made by counsel in the course of the Inquiry held last week before the Board of Trade Committee, in regard to an Application for a Marking Order under the Merchandise Marks Act), to the effect that Siemens Lamp Company and the Cosmos Lamp Company have been purchasing our lamps, as reported in your issue of the 10th instant.

We desire to point out that, in the course of the hearing before the Committee, it was accepted by our counsel that the suggestion was an incorrect one, and the firms named had witnesses present who were in a position to disprove it.

We shall be very much obliged to you if you will publish this letter in your next issue, as we are very anxious that the real facts should be known, and the misunderstanding cleared away.

Philips Lamps, Ltd.,
(A. DE JONG, *Managing Director*.)

London, *February 17th*, 1928.

[The facts were stated in our own report of the inquiry, on p. 306 of our last issue.—EDS. ELEC. REV.]

Legal.

An Unlicensed Transmitter.

AT the Rochdale Police Court, on February 10th, John Butterworth was charged with having installed and used a radio transmitting apparatus without a licence. Evidence was given that the defendant had been refused a licence, and had promised to dismantle his station. He continued to transmit messages, however, and had given the authorities a great deal of trouble. The defendant pleaded that his enthusiasm for his hobby had overcome him. The magistrates imposed a fine of £10, together with five guineas costs.

Fraser v. Correcta Light, Ltd.

IN the Mayor's and City of London Court, on February 16th, before the Common Serjeant, Sir H. F. Dickens, K.C., a claim was made by Mr. F. A. Fraser, electrical engineer, Kingston, against Correcta Light, Ltd., for £42 11s. arrears of salary alleged to be due. The defendants stated that the plaintiff had received a week's notice on October 7th, and the salary due had been paid into Court, leaving the sum of £32 in dispute.

COUNSEL for the plaintiff said that the defendant company was formed for the purpose of exploiting a patent in connection with the head lamps of motor-cars. The plaintiff was employed as manager of the company at a temporary salary of £4 per week. His wages were paid weekly, but in irregular amounts, as the company was short of money. On October 7th Mr. Treglown, a director, went into the office and, addressing those present, said that the company had no more money and the staff had better look for other jobs. The Common Serjeant said that that was not definite notice, and gave judgment for the plaintiff for £32, with costs.

General Radio Co., Ltd.

BEFORE Mr. Justice Clauson, on February 16th, Mr. F. Whinney applied in a debenture holders' action on behalf of the First and Second Co-operative Investment Trusts for the appointment of Mr. Fisher, C.A., as receiver and manager of the General Radio Co., Ltd. Counsel stated that under a trust deed the company had agreed to pay monthly sums into a sinking fund, but had not kept up the payments. A judgment had been recovered against the company.

COUNSEL for the General Radio Co. said that his clients consented to the appointment of a receiver.

His LORDSHIP made the order subject to counsel appearing for the Redeemable Securities Investment, Ltd., which was co-defendant in the matter.

Mr. WHINNEY asked to be allowed to borrow money for wages, but his Lordship said that counsel must go to Chambers for that. He also said that the manager was not to act as such beyond June 1st without his (the Judge's) leave. If counsel were prepared to treat that hearing as the trial of the action they could also take immediate judgment.

Rees Roturbo Development Syndicate, Ltd.

EXCESS PROFITS DUTY ON PATENT RIGHTS PROCEEDS.

IN the House of Lords, on February 14th, two appeals by the Inland Revenue authorities from decisions of the Court of Appeal reversing orders made by Mr. Justice Rowlatt were heard. The Special Commissioners for Income Tax decided that the Rees Roturbo Development Syndicate, Ltd., was liable to include in its returns for the purposes of excess profits duty a sum received for the foreign patent rights in the Rees Roturbo pump. The company's assets consisted entirely of the group of patents relating to this pump and improvements, and of investments. Its main business was the granting of manufacturing licences, but it sold the United States patent rights to the Manistee Ironworks Co., and received as its share the sum of £15,898. The Commissioners decided that the profit on the sale of patents, represented by this sum, arose in the course of the company's business and was subject to income-tax and excess profits duty. Mr. Justice Rowlatt confirmed this, but the Court of Appeal reversed his decision, considering that the sum in dispute was part of the company's capital assets.

Lord BUCKMASTER, in delivering judgment, said that the view of the Court was that the contention of the Commissioners and Mr. Justice Rowlatt should be sustained, and the appeals were therefore allowed.

Electrolytic Smelting of Zinc.

The Chemical and Metallurgical Corporation announces that Mr. A. A. Zentner, who was for many years associated with the Anaconda Company as metallurgist, and Mr. S. B. McCluskey, metallurgist to the Mexican Corporation, are now in this country for the purpose of advising the Corporation as to the erection either in England or abroad of an electrolytic smelter for dealing with the zinc residue obtained from the ore treated by the company's process.—*Financial Times.*

Published Specifications.

Compiled expressly for this journal by a firm of Chartered Patent Agents. The numbers in parentheses are those under which the specification will be printed and abridged, and all subsequent proceedings will be taken.

1926.

20,815. "Electric switches." Simplex Conduits, Ltd., and H. F. McLoughlin. August 24th, 1926. (284,360.)
20,938. "Electric signalling systems." Eastern Telegraph Co., Ltd. (H. V. Higgitt and J. S. Jenkins). August 25th, 1926. (284,361.)
21,264. "Electrical relays." English Electric Co., Ltd., and G. Tilstone. September 21st, 1926. (284,366.)
26,327. "Advertising signs and like devices." A. H. Brackensey and Franco-British Electrical Co., Ltd. October 21st, 1926. (284,378.)
26,618. "Railway signalling systems." Westinghouse Brake & Saxby Signal Co., Ltd. (Union Switch & Signal Co.). October 25th, 1926. (284,384.)
26,619. "Railway signalling systems." Westinghouse Brake & Saxby Signal Co., Ltd. (Union Switch & Signal Co.). October 25th, 1926. (284,385.)
26,620. "Railway signalling systems." Westinghouse Brake & Saxby Signal Co., Ltd. (Union Switch & Signal Co.). October 25th, 1926. (284,386.)
26,678. "Electromagnetic relays." Sterling Telephone & Electric Co., Ltd., and N. Blades. October 25th, 1926. (284,390.)
26,684. "Sparking plugs." K. E. L. Guinness. October 25th, 1926. (284,391.)
26,728. "Electrical measuring or indicating instruments." General Electric Co., Ltd., and C. G. Eden. October 26th, 1926. (284,395.)
26,840. "Coil holders as used in wireless receivers." E. J. Gracie. October 27th, 1926. (284,3.9.)
26,855. "Apparatus for controlling the circuit of an intermittently operated device, for example, a flashing lamp." Radio Patents Corporation, Inc. September 11th, 1926. (277,278.)
27,050. "Mountings for mouthpieces for telephones and the like." D. S. S. Steuart. October 29th, 1926. (284,406.)
27,122. "Electric signalling systems." British Thomson-Houston Co., Ltd., H. S. Petch and E. L. E. Wheatcroft. October 29th, 1926. (Addition to 272,975.) (284,409.)
27,614. "Luminous electric discharge tubes." J. Brettmon. November 3rd, 1925. (261,003.)
28,582. "Process of and apparatus for the cooling of piston compressors." Soc. Technique d'Etudes et d'Entreprises pour l'Industrie, and A. Huguenin. August 30th, 1926. (Addition to 260,984.) (276,612.)
28,640. "Systems of electric braking." International General Electric Co., Inc. November 14th, 1925. (261,405.)
30,732. "Electrical fuses or cut-outs." British Brass Fittings, Ltd., and G. N. Sperryn. December 4th, 1926. (284,432.)
31,211. "Electrically-driven trolleys or carriages, and runways for same." G. L. Davidson and S. C. Matthews. December 9th, 1926. (284,434.)
32,602. "Electrical impedance networks." General Electric Co., Ltd., and A. C. Bartlett. December 17th, 1926. (284,440.)

1927.

1,732. "Automatic or semi-automatic telephone systems." Siemens Bros. and Co., Ltd., and C. Lambert. January 20th, 1927. (284,460.)
2,575. "High-frequency electrical circuits." C. Lorenz Akt. Ges. January 30th, 1926. (265,229.)
2,888. "Loud speakers." R. W. James (Premier Laboratory Co.). February 1st, 1927. (284,467.)
3,905. "Automatic electric elevators, lifts, and hoists." C. P. Medley. February 11th, 1927. (284,475.)
8,373 "Sliding current-collectors for electric vehicles." J. F. De Tovaros. March 26th, 1927. (284,496.)
10,950. "Disk coils for transformers." Siemens-Schuckertwerke Ges. April 24th, 1926. (269,933.)
12,061. "Electric condensers." British Thomson-Houston Co., Ltd. May 5th, 1926. (270,735.)
12,260. "Wireless signalling." Soc. Française Radio-Electrique. May 10th, 1926. (270,749.)
14,038. "Electric switches." Simplex Conduits, Ltd., and H. F. McLoughlin. August 24th, 1926. (Divided application on 20,815/26.) (284,520.)
14,163. "Connection for cables." Metallbank und Metallurgische Ges. June 2nd, 1926. (272,196.)
14,657. "Reception of electrical oscillations." C. Lorenz Akt. Ges. February 3rd, 1926. (Divided application on 3,027/27.) (271,911.)
15,396. "Electric fire or radiator." H. H. Berry. June 9th, 1927. (284,526.)
15,514. "Automatic electric circuit-breaker." H. Pecheur. April 4th, 1927. (284,528.)
18,385. "Electric circuit-interrupters." British Thomson-Houston Co., Ltd. July 12th, 1926. (274,121.)
18,551. "Means for controlling the electric switches of electrically-heated water-heaters or geysers." J. H. Ewart. July 12th, 1927. (284,547.)
18,573. "Loud speaker." Hopkins Corporation. July 24th, 1926. (274,847.)
19,693. "Electric condensers and methods of manufacturing the same." British Thomson-Houston Co., Ltd. August 18th, 1926. (276,319.)
20,468. "Directional radio receiving apparatus." Dr. A. Esau. October 29th, 1926. (279,794.)
22,332. "High-tension electric cables." Soc. Italiana Pirelli. August 31st, 1926. (276,986.)
23,094. "Electric signalling circuits." Submarine Signal Corporation. June 20th, 1927. (284,558.)
23,297. "Circulatory cooling systems for dynamo-electric machines." Akt.-Ges. Brown, Boveri et Cie. September 3rd, 1926. (277,031.)
23,430. "Cooling systems for dynamo-electric generators." Akt. Ges. Brown, Boveri et Cie. September 13th, 1926. (Addition to 275,353.) (277,336.)
24,734. "End-pieces or terminals for electric wires." H. A. King. September 9th, 1927. (284,560.)
23,790. "Earth-leakage protection devices for alternating-current electric machines." International General Electric Co., Incorporated. September 24th, 1926. (277,956.)
24,559. "Amplification of variable electric oscillations, more particularly for use in wireless telephony." H. M. Saubanere. September 17th, 1927. (284,168.)
24,632. "Electric incandescent lamps intended to be used in series." F. Eckhardt and M. Hohnekamp. September 27th, 1926. (277,961.)

Trade Mark Applications.

THE following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from February 15th :—

M.V.D. (lettering and design). No. 487,168. All goods in Class 5.—Metropolitan-Vickers Electrical Co., Ltd.

Lassophone. No. 486,842. Class 8. Radio-telephonic apparatus.—H. H. Lassman, trading as the East Ham Wireless Supplies, 429, Barking Road, East Ham, E.6.

Quickmec. No. 486,785. Class 13. Electric switches (ordinary), contacts, and terminals, cut-outs, lampholders, plug couplings, lamp pendants, and fittings.—Marshall Electrical Co., Ltd., Tottenham Mews, Tottenham Street, W.1.

Beanco. No. 481,755. Class 50. Electrical insulating material, &c.—Baxendale & Co., Ltd., 41, Miller Street, Manchester.

New Work for Contractors.

Particulars of new works and building schemes for the use of electrical installation contractors in search of work and all interested in the sale of electrical and allied plant and other products.

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

ASHTON-UNDER-LYNE.—Reconstruction of premises, 236, Stamford Street, for J. Crook & Son, Ltd.

AYR.—348 houses, Heathfield site (£128,576); borough engineer.

BARNSLEY.—198 houses, Burton Grange; borough engineer.

BATLEY.—Additional 30 houses, for the T.C.; borough surveyor.

BEBINGTON.—22-bed ward, Clatterbridge Hospital, for the Wirral Joint Hospital Board; Campbell & Honeyburne, architects, Bluecoat Chambers, School Lane, Liverpool.

BEDFORD.—Petrol depot, Melbourne Street; National Benzole Co., Ltd.

BEDMINSTER.—100 houses, Duckmoor Road; Bristol Housing, Ltd.

BEXLEY.—Child welfare centre for the U.D.C.; W. T. Howse, surveyor.

BLACKBURN.—Re-erection of portion of works, Burnley Road, for John Eccles (£10,000).

BRIGG.—Beet sugar factory (£300,000), for the Second Lincolnshire Beet Sugar Co., Ltd. (Brigg Factory); H. Beacon, managing director.

BRISTOL.—Rehousing scheme (£750,000), for the T.C.; borough surveyor. 56 houses, Sea Mills Estate; city engineer.

BRIXWORTH.—Waterworks pump house, with installation of electric motor and centrifugal pump, East Haddon Works, for the R.D.C.; H. E. Kingston, clerk, 20, Guildford Road, Northampton.

BROADSTAIRS.—Skin factory, Camden Road, Reading Street, for S. Berry, Margate.

BROMLEY.—Secondary school, Hayes, for Kent E.C.; E. Salter Davies, director of education, Sessions House, Maidstone.

CARLISLE.—Additions, Carlisle Infirmary, Newtown Road; A. W. B. Jack, architect. Electric lighting, Covered Markets; borough electrical engineer. Electric greyhound racing track, Harrady, for Major English and Somerside & Jackson; Mr. Foxall, architect.

CLYDEBANK.—100 houses, Dalmuir; burgh engineer.

COVENTRY.—Reconstruction of Opera House, for Bennett Theatres, Ltd. Factory, Aldbourne Road, for Riley Engine Co. Bank, Stoney Stanton Road, for Barclay's Bank, Ltd. Houses (43), Beresford Avenue and Medina Road, for W. R. Lane.

DARTFORD.—Laboratory, Temple Hill; Burroughs, Wellcome & Co.

DORCHESTER.—Sheds, Weymouth Avenue; British Petroleum Co., Ltd.

DUMFRIES.—Electric light installation, Dumfries and Maxwelltown Combination Hospital; John Barker, burgh surveyor.

ECCLES.—Additional 76 houses, Westwood Park, for the T.C.; borough surveyor.

EDINBURGH.—New school buildings for Merchiston Castle School (£100,000); the headmaster.

FARNHAM.—68 houses for the U.D.C. (£31,595); Council surveyor.

FIFESHIRE.—Special school with residence for defectives at Halbeath; extensions at Markinch School (£9,650); clerk, Education Authority, Kirkcaldy.

GILLINGHAM (KENT).—Additional 110 houses, for the T.C.; borough surveyor.

GLASGOW.—Cinema, Great Western Road; N.B. Theatres, Ltd. 60 tenement houses, Crossloan Road; housing director. Extensions, Alhambra Theatre, Waterloo Street; John Burnet, Son & Dick, architects.

GRAVESEND.—Rebuilding North Kent Hospital (£60,000); secretary.

HAMILTON.—Hippodrome for E. H. Bostock & Sons, Ltd.; the manager.

HASTINGS.—Alterations and additions, Havenhurst Mills, Bexhill Road; H. M. Jeffery, architect. Offices and flats, Verulam Place; C. Cowles-Voysey, architect.

HILL AND CAKEMORE (WORCS.).—Cinema (£12,000); G. Green, Housing, Ltd., Black Heath.

HIXBERRY.—Mental colony; Herts. C.C.

HOYLAND.—Two schools, for West Riding E.C.; F. A. Darwin, clerk, County Hall, Wakefield. Roman Catholic church; Rev. Father Grogan.

HUDDERSFIELD.—Additional 150 houses, Turnbridge, for the T.C.; borough architect, 26, Ramsden Street.

IRISH FREE STATE (MARYBOROUGH, QUEEN'S CO.).—Cinema; T. McNamara & Sons, architects, Dawson Street, Dublin.

KENDAL.—Houses (100), for the T.C.; P. A. Baines & Son, builders, Preston.

KIRKCALDY.—School at Sinclairtown; clerk, Fife Education Authority.

LEOMINSTER.—Rebuilding Stocking Hill, Newlands, for S. R. Taylor.

LINCOLN.—Reconstruction of refuse destructor, with salvage plant (£11,973), for the T.C.; S. C. Baggott, city surveyor.

LONDON (ILFORD, E.).—Primitive Methodist church, Seven Kings; trustees.

(STEPNEY, E.).—Roman Catholic central school, Baker Street; Rev. Canon T. Ring.

(ST. JOHN'S WOOD, N.W.).—Buildings, corner Loudoun Road and Langford Place; A. Savill & Sons, Lincoln's Inn.

(DEPTFORD, S.E.).—Technical institute (£120,500); L.C.C. Education Committee.

(GREENWICH, S.E.).—School, Charlton Park; L.C.C. Education Committee.

(KENNINGTON, S.E.).—Extensions, Stannary Street; Smith's Meters, Ltd.

(LEWISHAM, S.E.).—Extensions, Central Library, High Street (£10,000); B.C. Libraries Committee. 10 shops, Bromley Road; J. Watt.

(LEE, S.E.).—Church, Burnt Ash Hill (£5,000), for the Wesleyan trustees; secretary.

(FULHAM, S.W.).—Club hall and flats, Rainville Road; S. Clough. 37 houses, Barons Court Road; Rowe & Binns.

(WESTMINSTER, S.W.).—Dwellings and shops, Grosvenor canal land; city engineer.

(WIMBLEDON, S.W.).—68 houses and 4 blocks of flats for the B.C.; borough surveyor.

LOWESTOFT.—Pavilion, Claremont Pier; F. W. Richards.

MANCHESTER.—Cinema (£400,000); Shaftesbury Estates, Ltd. Nurses' home, Crumpsall Infirmary, Crescent Road, Crumpsall, for Board of Guardians; A. J. Murgatroyd, architect, 23, Strutt Street, Manchester.

MARKET HARBOROUGH.—Boiler house, Springfield Road; W. Symington & Co., Ltd.

MIDDLETON.—Housing scheme (100); borough surveyor.

NETHERNE.—Extensions, Mental Hospital; Surrey C.C.

NORTHFLEET (KENT).—Offices, showrooms, and workshops, Gas Company; Gordon Stanham, architect. Laboratory, canteen, &c., Associated Portland Cement Manufacturers, Ltd. Extensions, Research Department, W. T. Henley's Telegraph Works Co., Ltd.

OXFORD.—Destructor, University Parks; curators of University Chest. Two secondary schools; W. G. Newton, architect, 4, Raymond Buildings, London.

PORTSMOUTH.—Saw mills, &c., Mills Road; Lille & Co.

RAWTENSTALL.—Factory extensions, Waterfoot, for the Newchurch Boot Co.

RICHMOND (YORKS.).—Girls' secondary school, for North Riding E.C.; director of education.

ROMSEY (HANTS.).—Housing scheme (50), for A. R. Wills and W. J. Chappell; Mr. Greenwood, architect.

SALISBURY.—Additional housing scheme (100), for the T.C.; city surveyor.

SANDWICH.—Celluloid factory; particulars from Carr and Mitchell, College Hill, Cannon Street, London, E.C. Central school; Kent Education Committee.

SHEFFIELD.—Baptist churches, Manor Estate and Langley Estate; secretary, local branch, Yorks. Baptist Association.

SKEGNESS.—Town hall, for the U.D.C.; R. H. Jenkins, surveyor.

SPONDON (DERBYSHIRE).—Cinema, Sitwell Street; L. Fred Smith, architect, Williams Deacon's Bank Chambers, Derby; Carney & Son, builders, Alice Street, Derby.

STOURBRIDGE.—Cinema, High Street, W.; Lloyd & C. Bray, Criterion Picture House, Dudley.

TAMWORTH.—Housing scheme (52), for the T.C.; borough surveyor.

WARWICKSHIRE.—Accommodation for mental defectives; County Council.

WELLINGBOROUGH. — Boys' secondary school for Northants E.C.; director of education, Northampton.

WINCHESTER.—New wiring system, Castle Yard offices; Winchester Castle Committee.

WISHAW.—Re-erection of offices, for the Glasgow Iron and Steel Co., Ltd.

WOKING.—Extensions, St. Martha's Printing Works, Old Woking; Unwin Bros., Ltd.